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More About Pinions.

BY A. H. CLEAVES.

In the American Machinist of May 6th, I had an article about working on pinions made from pinion wire. This wire is not kept in stock now by dealers as much as formerly, and, in this instance, had to be imported. The material was very fine and close to standard, and for pinions for cyclometer and novelty work of various kinds is excellent.

The pinion department in a modern American watch factory is perhaps the most extensive department in the business, involving the most expensive, diversified, and complicated automatic machinery in the watch making trade.

In an article of September 10th issue, on "Sub-presses and Compound Dies," I presented some methods of die making that probably suggested unnecessary expense to some readers, but which were really cheap, not only in view of the amount of work done with them, week in and week out, but also because they contribute by their maintenance of accuracy to the success of subsequent operations performed by other tools upon the same pieces.

Treating the use of drawn wire pinions then as a different grade of material from that used in a fine class of watch work, the following hints may be useful, as supplementary to the article in May 6th issue. In cutting the pinions off and pivoting them, as shown in the article referred to, as well as securing them in the seven tooth wheel, as shown in Fig. 3, herewith, several difficulties had to be overcome, and numerous damaged pinions made right.

In cutting the pivots in the screw-lathe, even with the careful provision made as shown in May 6th issue, some of the pinion leaves were turned down at the ends and lodged together just at the place where they were to engage with two other wheels. But the worst trouble came from the use of a staking tool that failed to enter *M*, Fig. 3, into *L*, centrally. This not only left the pinion out of true every way, but bent its teeth.

Without stopping to explain how not to do the work, although it might be interesting and useful many times, a description of how to do it quickly and par excellence will do better.

In Fig. 1, *A*, *B* and *C* show sections of staking stand made of any castings (*A* and *C*) at hand, and ½-inch by 2-inch or 3-inch machine steel, or wrought-iron bar to tie them together. The spindle *D* has a collar and spring at the top (not shown in the sketch) to keep it up.

F is a hardened steel block. *G* and *H* are hardened staking dies, shown by same letters in Fig. 2. The lever *J* moves the piece *I* to lift the dies up to allow the removal of wheel and pinion after staking. *K* is a stud for spring to lift handle *J*, and is slotted in the center to let *J* work in it.

In using, the tool *H* being in place, wheel *L* is dropped onto it, next the die *G*; then the pinion *M* is placed in *G*. The point or end *N* of hardened stake *E* drives *M* into *L*; and the shoulder *O* of *E*, meeting *G*, closes in the metal of the wheel upon the pinion, as shown at *P*, in Figs. 2 and 3.

The points of the pinion *M* enter the brass wheel *L*, as shown at Fig. 3, requiring but little impression to keep them

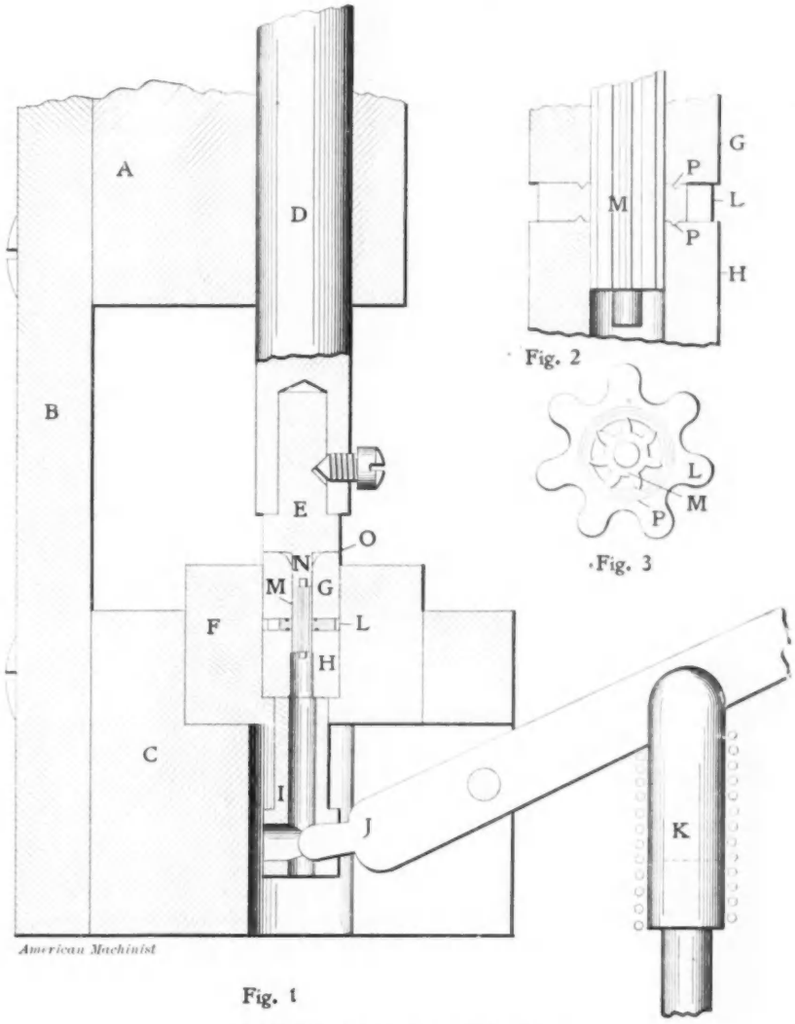


Fig. 1

STAKING TOOL FOR PINIONS.

Fig. 2

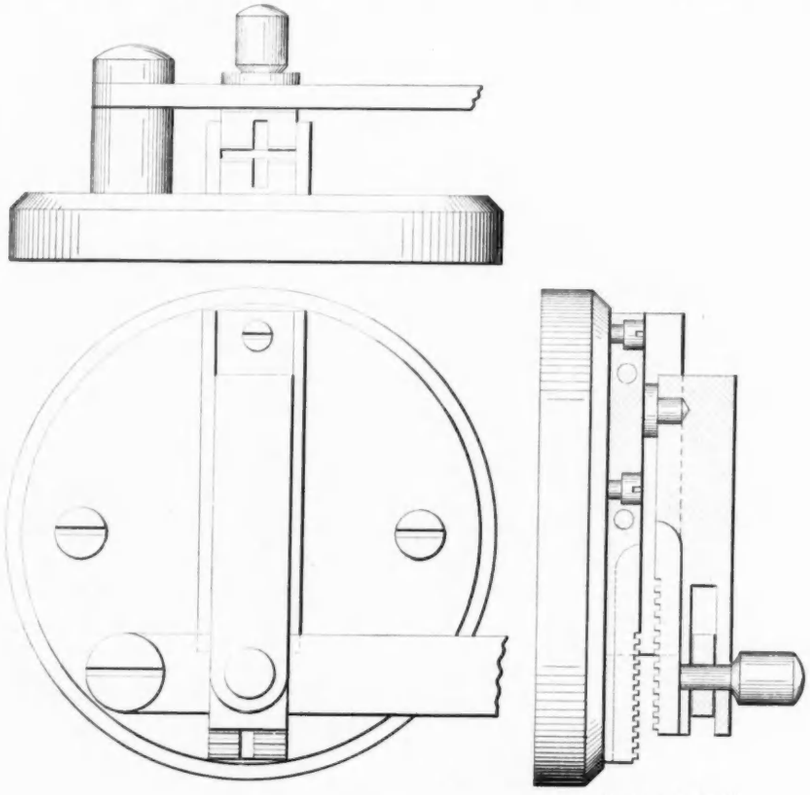
Fig. 3

from turning while the chips pass down through the hole in *I*, Fig. 1, and the stake *P* keeps the wheel from moving endways.

It will be seen that *N* has a hole in the end to save the pivot, and also depths *M* in *L* exactly from that end; while the staking done with *G* and *H* by striking the top of *D* with hammer, is invariable in all the pieces, and the result is central all through.

Fig. 4 gives plan and two elevations, part sectional, of a drawing showing how the damaged or bent pinion leaves were straightened out again.

It will not require lettering and description in detail, as it explains itself.



American Machinist

Fig. 4

DEVICE FOR CORRECTING SPOILED PINIONS.

There are two hardened racks, the upper one sliding in sides riveted to the lower one, which is screwed to the bench. The slots shown in end view are for wheel in vertical position, or set up edgeways. The handle (broken in the drawing) has a slot for a pin to work in, which carries upper rack, and the handle can be lifted a little to enter pinion, and pressed down as a lever to roll the pinion between the racks. Any Brown & Sharpe or other small-tooth rack cutter approximating the pinion tooth, without fitting, will answer to make the racks. These tools were "O. K." Crooked pinions were drawn out, and re-staked, and the teeth rolled straigh, saving the whole lot.

Chicago, Ill.

Unwin on the Hardness of Metals.

In a recent paper before the Institute of Civil Engineers of Great Britain, Prof. W. C. Unwin, the well-known authority, reports a series of tests of materials, based on the relative indentation, by which he determines their hardness and other properties. Prof. Unwin says:

"Ordinary processes of testing, in which the tenacity and elongation are measured, indicate indirectly the condition of the material, but they cannot always be conveniently applied, and their indications are open to misinterpretation. An ordinary tension test of a rail or axle for instance does not clearly discriminate whether the material is properly annealed or not, and, in such cases, a more direct and sensitive test of hardness is required. For many other purposes, as in deciding on the relative values of different alloys, a direct measure of hardness would be useful."

Mole's and Turner's hardness tests by scratching are referred to, and evidence given that they are not sufficiently accurate and discriminating.

Middleberg first used the relative indentation of knife-edges in determining the hardness of tires, as long ago as 1886, followed by Martel, in the foundry of Ruelle, France, some years later.

The author's method of measuring hardness is as follows: "The indenting tool is a straight knife edge; the test specimen indented is a short bar of square section; and indentation is produced by a steady load."

It was found that "the curves obtained by plotting the logarithms of loads and indentations as ordinates and abscissae, were approximately straight lines," and "also that for very different metals the slope of the lines is nearly the same." The indentations are nearly proportionate to the loads applied up to a point where stretching of the test piece begins. The effect of width of test bar was also determined and was found to affect the results roughly speaking as the cube root of the width.

"By far the most useful application of a hardness test for the engineer would be to discriminate between different qualities of steel and difference of treatment as to annealing and tempering." The results were so striking that they left no doubt about the qualities or identification of the various specimens under test. Curves of hardness are given, made by a test of cast steel, when hardened in oil, when annealed, and when in normal condition, as from the mold; also those of mild steel, normal, hardened, as well as annealed; also of brass No. 1, aluminum, copper, and of zinc and lead, and their relative hardness is given as:

Cast steel, normal	554.0
Annealed by method A	538.0
Annealed by method B	527.0
Annealed by method C	503.0
Do., hardened in oil	866.0
Mild steel	143.5
Copper, annealed	62.0
Copper, unannealed	105.2
Brass, No. 1	221.0
Brass, No. 2	246.0
Aluminum, squirted	41.8
Aluminum alloy, cast	103.5
Lead, cast	4.2
Zinc, cast	40.8

Having had the various metals tested by Turner's method, of scratching by a diamond, corroborative results were obtained, but it is also stated that: "It will be seen that the relative hardness follows the same order by whichever method it is determined. But the scale of hardness with the indentation method is a more open scale than with the scratch method. Further, the indentation method is easier, more definite, and requires less skill."

GUS C. HENNING.

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The Paragon Ball-Bearing Speed Indicator.

We herewith illustrate an improved and perfected speed indicator. The name by which this class of instruments is designated is not a happy one, nor altogether correct, but it seems to have been generally adopted. The instrument shown in the half-tone is a form of the well-known and widely used device for counting the revolutions of anything the end of

which is accessible, usually a shaft or spindle.

The instrument is worthy of some attention, if merely as a sample of exhaustive invention in a limited field. The designer set out to produce the most perfect article of the kind which could be devised. We happen to know that he has spent a good deal of time and much money upon it, and he seems to have secured more desirable features and fewer that could by any possibility be considered objectionable than it would at first seem possible to embrace in a thing so small and simple. The first thing was to provide a ball bearing to take the thrust of the spindle when pressed against the shaft whose revolutions were to be counted. Then the uncertainty in stopping and starting the old speed indicator was looked out for. The spindle of this instrument may be placed in position and may be running all right, but no count will be made until the trigger is pulled, and the counting or recording ceases instantly when the trigger is released, which makes it easy to take a record for any minute, half minute, or any other measured interval of time. In this instrument no matter in which direction the spindle turns the recording dial always turns and counts in one direction. A brake holds the dial from turning when not in use. The instrument registers continuously from 0 to 5,000 revolutions, and then goes on and repeats, but if continuous counting is not required the register is easily and instantly turned to zero for a fresh start.

The dial face is a single revolving plate, having graduations on the periphery reading to 100, and an inner circle with 50 divisions suitably marked for reading the hundreds. The edge of the dial has a hundred teeth with which the worm engages, as with the common indicator. A fixed pointer on the case indicates where the readings are to be taken. A smaller pointer for the inner circle seems to travel around with the entire dial, but for each revolution it really advances, or rather moves backward one point, or records one hundred. Fixed to the back of the dial, see Fig. 2, is a spur gear of 49 teeth; another gear free to revolve has 50 teeth. These gears are of the same diameter and both mesh into an idler pinion on a fixed stud, so that one tooth less than a complete revolution is made by the one for a complete revolution of the other. The 50-tooth gear is mounted on a sleeve with a taper hole, and the taper spindle in it carries the pointer on the front and has a milled head on the other end with a push spring under it. When the spindle is pressed forward it is freed on the taper and it, with the pointer, may be moved and set as desired.

The spindle of the instrument carries a double worm, one end right hand and the other left, which fits loosely upon the small part, and a screw in the worm projects into a helical groove on the spindle; when the spindle is turned in one direction the worm goes as far one way as this groove will permit, and when the revolution is in the other direction the worm runs along to the other end of the groove, in one case bringing the right-hand worm to engage with the dial, and in the other case the left hand worm is engaged, thus ensuring that the dial will always travel in the same direction.

A little spiral spring keeps the dial case raised up, as shown in Fig. 1, so that the teeth on the edge of the dial do not engage the worm. When the spindle is running and it is desired to make a count, the case is pulled down by pressure on the finger piece or trigger, and removing the pressure of course stops the dial again. If the trigger is pressed slowly and the dial case is brought only partly down, the first action is to press the end of a little wire spring which bears as a brake on the gears behind the dial and prevents rotation. When this brake is thus released the dial may be freely turned and set as desired. To set the inner pointer the dial case is brought down so that the worm is engaged, thus holding the dial from turning, and by pressing forward the central spindle, as before described, the pointer for the smaller circle may be set. The end of the spindle which takes the thrust is conical, and bears against three steel balls in the screw plug *A*, which allows it to turn quite easily. This plug is screwed in by a pin wrench to adjust the spindle to

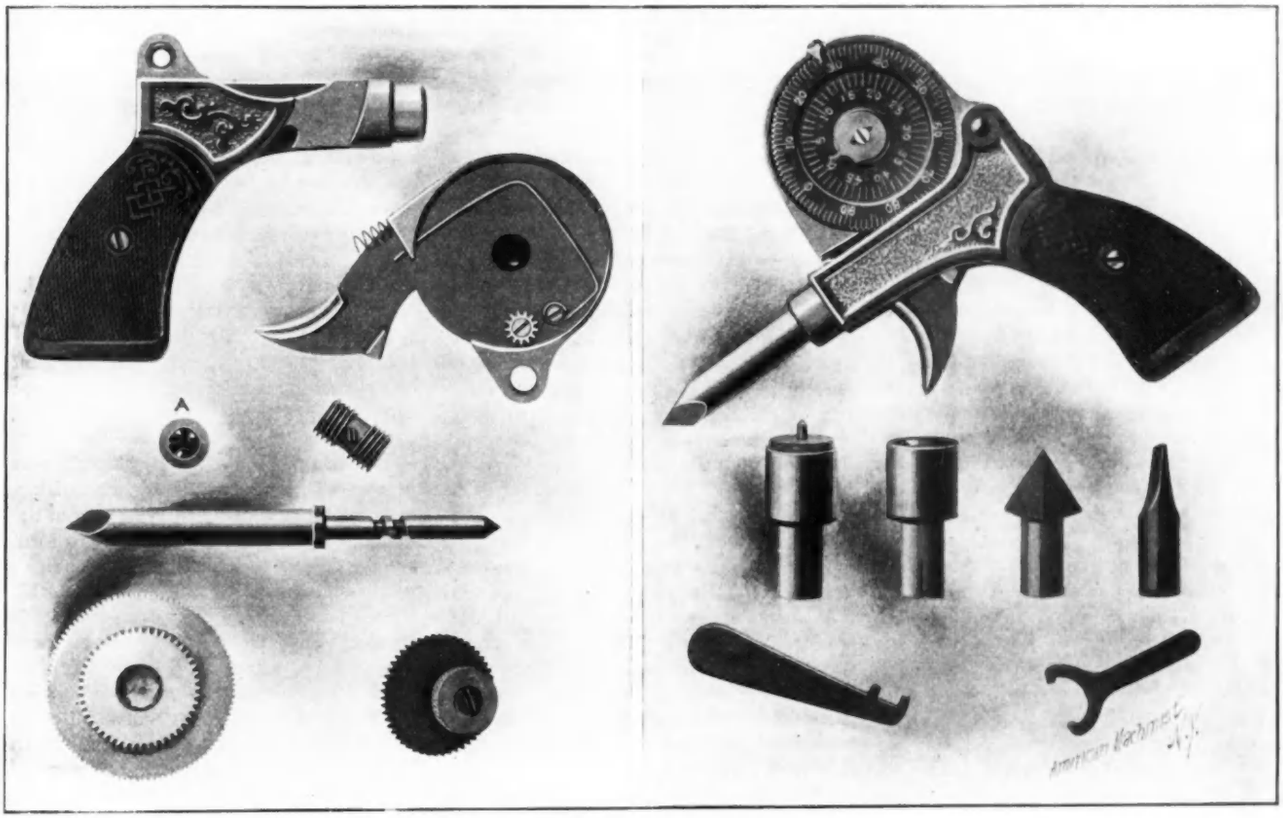

Fig. 2. PARAGON BALL-BEARING SPEED INDICATOR. Fig. 1.

the forward shoulder as may be required.

The instrument is well made throughout, well finished externally, and mounted in a neat case. Several changeable ends or points are provided for the different places where the counter may be used, as for a flat surface, for a conical point, a conical center, or a screwdriver slot. The instrument is not one to be kicking around the shop, but will be an appropriate accompaniment of the steam engine indicator. It is made by Lintner & Sporborg, Gloversville, N. Y.

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Automotor Cars in London.

It really seems that so far as London is concerned the much criticised motor car has come to stay. A year ago an occasional benzolene car was to be seen wending its noisy, and, to most people, noisome way through the streets; and it is now several years since an electrically propelled omnibus made an occasional appearance. But in both cases there was no particular appearance of permanency, and because these pioneer vehicles were so far from perfect it was confidently declared by many people that they never would be a success. At the moment of writing, however, there are about twenty or thirty electrically propelled cabs in regular work in London. I am informed that they carry accumulator cells of a capacity sufficient for a run of fifty miles, and these batteries are so arranged that they can be disconnected, removed and replaced with freshly charged cells in a very few minutes. Throughout all London there are very few poor streets, all are well paved, and the chief cab area is smooth asphalt or wood, the latter often Australian ironbark or jarrah, or some other similar hardwood of the Eucalyptus order. If accumulators will work anywhere successfully they should do so in London, than which they will find no place more suitable for their durability. The few cabs thus far at work must be doing well and losing very little time, for I have seen within the space of a minute at least four passing a particular spot at the West End, and I never go into the city without seeing at least one, and as there are said to be about 20,000 cabs in London, the above is a very fair proportion to see out of the few so far at work. These new cabs have two speeds, one of ordinary running, the other a creeping pace, and they seem perfectly manageable and easy to steer, and so far I have not seen any mishap with them. Excepting these electrical cabs, the other motor vehicles here appear to be all of the naphtha or oil variety, and what has most struck me lately has been that the old familiar odor of the motor car has been absent. These oil-driven cars comprise parcel vans of large size, and also some small, light cars which seem as though they were doing light parcel work. Others, again, I have seen bearing rather prominently the names of their owners, as though an advertisement of certain goods were being relied upon as the outcome to be derived from the attention which the public still direct upon the motor car. This pointed attention has very much slackened off, however, in the case of the electrical cab, and is becoming less with the oil cars also. Though still, perhaps, used as much for advertisement effects as anything else, the oil car really does appear to have reached a condition of mechanical perfection which will make for its wider employment, and it is impossible not to contrast its length with the combined length of a car and quadruped, to the advantage of the motor car. While so much abuse has been heaped upon the motor car as a vile smelling thing, its detractors evidently gave no thought to two important factors. One was that improvements were possible, and all mechanical experience pointed to the extreme probability of improvements being closely contingent upon further experience, while it was also unreasonable to the use of imperfect machines, thereby depriving them of the opportunity of disclosing their faults and opening up the way to improving them; and in the second place, the objectors to the motor cars entirely overlooked the really objectionable personal habits of the horse. The horse is all right for a run across the fields, or even for farm work, but his personal habits render him very far from being a suitable motive power in a crowded city. If there were no horses, the wear and tear of street pavements would be very much reduced, for it is to the pounding effects of iron-shod horses and not to the small effects of rolling wheels that street pavements wear out. This is one of the four main causes of street debris, the second, and often the chief cause is the sand, shells or gravel that are sprinkled on the streets to prevent the horse from falling, for the horse is a very curious piece of machinery when looked at as a machine. It is supported when at rest on four hinged columns, but when in movement its supports are rarely more than three, and in rapid movement two. At the same time the supports are also propellors, and the rapid alternations of the functions of propulsion and support are such as to make a pavement unsuitable for the quadruped, perhaps very suitable for wheels. It thus appears that expensive rubber tires are rapidly cut to rags by the material employed to increase the friction of the horses' feet. The horse himself is the cause of the third and most insanitary source of street debris, so that if he were abolished, the fourth source alone would remain, namely, the accidental bits of coal, sand or other material from carts. The abolition of the horse would, in fact, reduce street cleaning to a mere fraction of the present amount. It would cut down the length of street occupied by a vehicle 40 to 50 per cent., and in London this would mean something very serious and would greatly facilitate traffic. There is some danger, perhaps, in the use of the more volatile of the petroleum series, but surely a good deal may be done to minimize this danger by the use of containers of tough sheet-steel, and of suitable pipe connections and other precautions suggested by a daily growing experience. At the time of the great boom in motor cars, about a year ago or less, we all knew that their advantages were grossly overstated, simply that heavily watered stock might be foisted upon the public, and many valueless so-called patents were thus exploited, whereas, the simple benzoline motor had in it the germ of success and could be employed without any very abnormal cost. The rest has become a question for the experimenter and improver, and he seems to be succeeding and to be gradually bringing the motor car to a condition that will some day soon rather open the eyes of the unprogressive half of us. A year or two since, when I was deputed to examine a number of French motor cars, I became convinced that when done into English they would force their way to the front. The French machinery rather impresses one with a sense of ingenuity than of practical everyday utility, yet many excellent reports were made of the running of the vehicles over the ordinary roads of the country, and it appeared likely that more simple arrangements would make the new motor cars really practical and satisfactory machines. It is generally easy at the first sight of a piece of machinery to form a fairly correct judgment as to its chances of ultimate success, and it was in this light that the oil motor presented itself to me. Like the early dynamos there was more brass and solder about it than seemed desirable, but the use of suitable materials of construction is a matter of experience, and what is good enough to show a principle may not be good enough for everyday work. At the same time any inventor who has something to show ought to do his best to have his demonstration machine made in good material and in a workmanlike manner, because he may not always be so fortunate as to have engineers or mechanics to persuade of its merits, and non-technical men are sometimes unable to distinguish between the failure of a mere insignificant detail and a defective principle.

W. H. Booth.

London, Eng.

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American machine tools, by hundreds of thousands of dollars' worth, are sent, freight paid, for thousands of miles across the ocean to England, Germany, France, Russia, Japan and China, and it is difficult to resist the contention that this simply means the success of free and intelligent labor well paid.—London "Times."

Some Cincinnati Shop Notes.

PAINT ON MACHINE TOOLS.

I think, Mr. Editor, that we machinists have been rather inclined to despise paint, and to look with more or less contempt upon the painter as a factor in machine construction. We have generally assumed that the only finish worth consideration is given by files and emery cloth, and perhaps it is just possible that we have carried this thing a little too far. We usually leave the painter entirely out of consideration in planning the progress of the work through the shops, with the result that he can usually operate only when no one else happens to want to do anything to the machine, and at such times and places as chance or good fortune happen to favor him. Work done in this way is, of course, not well done, and that this paint is not well put on is shown by the frequency with which a very little lubricating oil running out of a journal will cut it off the frame of a machine in a vertical streak reaching to the floor.

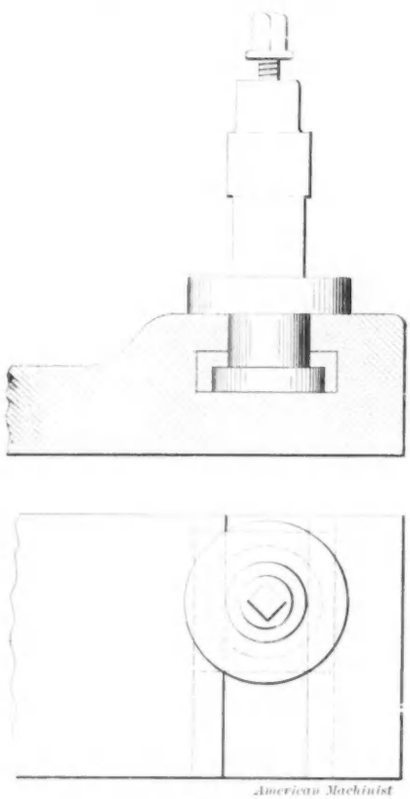

Fig. 1

A STIFF TOOL POST.

The Cincinnati Milling Machine Company have changed all this, so far as their work is concerned, by the establishment of a separate department which is devoted exclusively to painting.

In this separate room the painting is of course done under the best possible conditions, with freedom from lubricating oil and dirt, and what contributes still further to the success of the work is the fact that all castings receive their first coat of paint before going into the machine shop at all. This plan seems to possess several advantages, among which are that the castings are thus made smoother and more agreeable to handle; that lubricating oil which gets on them while in the shop does not give so much trouble afterwards, and that during the process of manufacturing, this first coat of paint has plenty of time to thoroughly dry and become hard. After this four other coats are applied, with the result that the painted surfaces not only look well to begin with, but they continue looking well very much longer than is common with the painted portions of machine tools. As we may as well confess among ourselves, there is a good deal of humbug in our so-called painting operations, anyway. The painter is expected to make the machine look as if the foundryman had attained a degree of skill which he really does not possess, and probably will never attain. I don't know that it makes any very great difference whether smoothness and a general good appearance are attained by the art of the molder or by that of the painter; but if by the painter, then it seems as though he ought to be given a chance to do his work under the best possible conditions and in the best possible manner.

A GOOD TOOL POST.

Is it not a little queer that a form of tool post should be almost universally adopted and used in one tool-manufacturing city, and as universally ignored elsewhere? I recently spent a few days in Cincinnati, and found lathe builders there using, almost without exception, the form of tool post shown by the accompanying sketch (Fig. 1), and which was originally patented by Mr. Chas. A. Bauer, when he was superintendent of the Niles Tool Works. The patent has long since expired, and the post is available for use by anyone, and my experience with it gives me the belief that it is at least twice as stiff as the ordinary tool post made in the common way, and it is also much less liable to break the top of the rest or to be itself broken. The advantages of it seem to be in the fact that the post itself has a bearing in the block around its entire circumference and that the square block in which it fits has a long and fair bearing in the T-slot, which is very much more substantial and surprisingly more staunch than the ordinary post with its little crescent-shaped bearing on each side of the T-slot. I have known of cases in which the ordinary tool post was taken out, thrown away, and one of these Bauer posts put in its place, with the result that the lathe, as a whole, seemed to be just about twice as stiff as it was before, and I am surprised that it is not more generally used.

In one Cincinnati shop, where they were building some lathes for foreign consumption, they were using the old-fashioned post on them, and told me that the improved form was objected to by their foreign customers, because it necessitated a wider slot in the tool rest; though what possible objection there can be to this increased width, is more than I am able to guess.

This post cannot be much, if any, more expensive than the ordinary form, and I am confident that it is in every way enough better to justify itself if it cost three times as much.

SOME UNUSUAL PLANERS AND A JOB OF SQUARING.

I saw on the erecting floor of the G. A. Gray Company's shop a planing machine of somewhat unusual proportions, being 32 inches square and to plane 24 feet long, the bed being 42 feet long. One had previously been built of the same length, but to plane 38 inches square, which is not quite such a wide departure from usual proportions. These machines were to go to Germany, and Mr. Gray was himself wondering somewhat for what particular purpose they were to be used. The beds of these machines, owing to their great length, had to be made in two parts, and some of the tools for making the joint between the parts interested me. I show by a sketch (Fig. 2) something of a special machine designed for facing the ends of such beds where the joint is made. It is about as simple as such a device could well be, and being much smaller and lighter than the piece to be operated upon it is taken to the work and clamped upon it by bolts. If the bed to be operated upon is the right size it is clamped directly to it, but if larger or smaller a blocking piece, such as is shown, is used, one side of which block fits the bed and the other the fixture, and both the fixture, and these pieces are so made that when clamped in place the device will face square; that is to say, it will face as nearly square as machine work can usually be depended upon to come. It will be understood that the end of the shaft next the observer has attached to it a radial arm of sufficient length to enable the slide rest which is fitted to it to sweep over the entire surface to be faced as it is fed in or out upon the arm by a star feed. Only one arm and rest are used, for the sake of

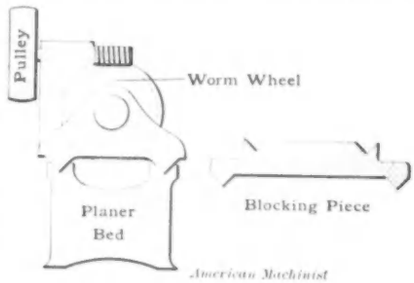

Fig. 2

A FACING FIXTURE.

simplicity of construction and operation, and they are counterbalanced by a weight which is placed diametrically opposite them. I have not sketched in these last named parts, but they will be readily understood. The piece to be operated upon is simply blocked up on the floor, under the line shaft, and driven by a belt from a pulley on the latter, the machine taking care of itself after the cut is started. The surface left by this tool is then perfected by hand-scraping and the use of a square, which is illustrated by the sketch, Fig. 3. This was designed and made in the shop, also, and with particular reference to this work, the object being to make it as light as possible, and at the same time in such a way as to be readily made exactly square, and maintained so. It is made of cast iron, in two parts, joined by bolts as shown, and the construction gives facility for readily correcting it if it is found to be out of square. It was found by experience with a square which was the predecesor of this one, that

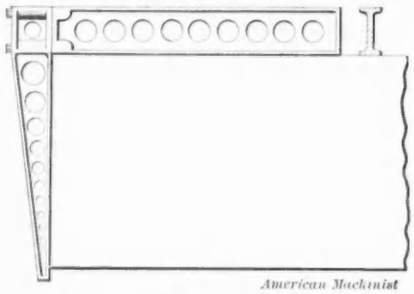

Fig. 3

A TRY-SQUARE.

it was desirable to make the blade as light as possible, since otherwise when placed over the end of the work as shown the weight of the blade deflected the stock. This square is applied directly to the planed surfaces of the ways, and the blade thus crosses the surface to be squared in two directions, and at four different points, tissue paper being used to determine the bearing of the blade upon the surface.

A DOUBLE-SPEED LATHE CARRIAGE.

At the shops of Rahn & Mayer, which is one of the newer concerns in the machine tool business, I found them devoting their attention exclusively to lathes and one of their ideas has a bearing especially upon one of the features of American lathes which is sometimes objected to by foreign users, and that is the slow motion of the carriage when it is desired to move it the full length of the bed. Mr. Rahn's idea, which he is putting into effect, is to so arrange the apron gearing that by pulling a pin operating a clutch, the motion of the carriage is increased in the ratio of about 2 or 3 to 1, and, thus arranged, a man can move the carriage slowly and powerfully, as in feeding by hand, or setting a facing cut, but when it is to be moved for some distance he can move it as rapidly as he may desire, if he first pulls this clutch pin. So far as I know, this is a new idea in lathe construction, and I am inclined to think it will prove a good one. At least it will overcome one of the objections made to American lathes in England, since it will allow the lathesman to move the carriage slowly and with precision as we do, or to make it jump every time the crank handle is manipulated, according to actual requirements, or individual idiosyncracies.

FACILITIES FOR EXPORT SHIPMENTS.

The export business of Cincinnati in the line of machine tools has grown to be a very important factor in many ways, and this was illustrated by the circumstance that during my call at the office of a friend, he was asked over the telephone if he should have any machinery for export that week, and, if so, when it would be ready. He then informed me that the Star Union line arranged for sending out a car, or as many of them as might be necessary, each week, and that these were reserved especially for the machinery manufacturers of the city, and are sent through with special reference to making connections with steamers at New York, so that there is the least possible delay and the greatest possible certainty of delivery, aside from the fact that by this means more favorable rates are obtained than would be possible were the shipments to be received and attended to in detail. This scheme, however, does not include the Davis & Egan Co., because that company owns its own cars, and uses them for such shipments.

PACKING MACHINERY FOR EXPORT.

Anything which assists in improving the work of packing machinery for export and in protecting it from damage while in transit, is, as we all know, of vital importance, and the losses of American tool builders from breakage and injury to machinery during shipment abroad has in the past been very considerable. These losses are, however, being lessened as experience is gained in this branch of the business; and at the works of the Davis & Egan Co. they have some ideas regarding this matter which seem to me to be excellent. In the first place, for the protection of their tools from rust, they have found by experience that where clear vaseline is used, although it will protect bright surfaces from rust perfectly, so long as it retains its place, it is likely or at least liable to be entirely removed from certain parts of the machines by simply flowing away, which flowing is greatly facilitated by a moderate degree of warmth, which the machine may attain by being exposed for a considerable time to sunshine, or by being placed on shipboard, or elsewhere, near a steam pipe or other source of heat. Experiments demonstrated that a cone pulley covered with vaseline and left to stand in their shop for a month or so, would be almost if not entirely free of it on top, all the vaseline having flowed around it to the bottom of the pulley.

They have corrected this trouble by mixing with the vaseline white lead, which mixture has sufficient tenacity to make it retain its place perfectly, and yet is easily removed upon the arrival of the machine at its destination. After trial of a number of different substances, they declare that this mixture of vaseline and white lead is the best thing they know of for the purpose.

I noticed several packing cases on the floor addressed to different European firms, and these cases were all painted dark, or perhaps black, with the directions, lettering, etc., in white. Upon inquiry I found that the reason for this was that it facilitated the selection of these cases in the foreign warehouses and on piers, etc., the representative of the firm to whom they were consigned being able to select these cases readily from among any number of other cases, simply by their general appearance, and that it sometimes saved a great deal of time in searching for cases and in overhauling piles of packing boxes on foreign wharves and in foreign warehouses.

I noticed, also, that these cases were put together with screws instead of nails, and certain of these screws were designated by the letter "A" marked upon the case, near them. Directions on the boxes specified that in removing the machine only the screws thus marked should be removed, and when this is done the machine can be taken out without further dismemberment of the case. Thus arranged, it is an easy matter to return the machine to its case for reshipment to its final destination, and this is of course much better than to be obliged to more or less completely destroy the case in getting the machine out of it, and perhaps be obliged to practically construct a new case, if the machine must be reshipped.

Experience has shown this firm also that it does not pay to use refuse or poor lumber for packing cases, and that, in the end, it is better to use a good quality of timber.

AN AGENT'S PIN.

In a Cincinnati machinery store I saw a lathe which brought to mind the question of how far a machine builder should go in doing what he believes is not right, or at least is unnecessary, in order to meet the wishes of selling agents, whose acquaintance with the machinery business embraces none of that kind of knowledge we are in the habit of calling "practical."

This lathe had two little gears in front of it by which the feed rod was driven, and opposite the point at which they engaged each other a small pin had been driven in so that it projected over the point of danger, and would thus prevent fingers or clothing from being drawn in

between the gears. I noticed that unless a crossed belt were used on the feed cones, the direction of rotation of these gears would be such that a finger could not be inserted between them anyhow; and, naturally, the insertion of this unnecessary pin seemed to me to be a case of thoughtlessness. Soon afterward I met the very excellent mechanic who manufactures this lathe, and went about his shop with him. In answer to my question, he said that pin was put in there simply because its insertion seemed to be the line of least resistance. He knew it was unnecessary and ridiculous, but the selling agents who handled the lathe not only did not know this, but thought it was necessary, and insisted upon having it. The pin therefore was put in, not to save fingers, but to save wear and tear of grey matter in apparently useless attempts to show the uselessness of the pin and the entirely innocent character of the gears.

The fact remains, however, that every machinist who uses this lathe will wonder what the pin was put in for, and whether or not the maker knew what he was about when he put it in. The machinist will never think of blaming the real culprit who is responsible for its presence, and I think that, under the circumstances, I would try to contrive some form of casing which would entirely cover up the gears, and then pretend that I had done this to keep dust and dirt out of them, and to make the lathe look neater.

S. T. FREELAND.

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The Place of Our Destination—XVIII.

Editor American Machinist:

However great a horror one may have of crossing the English Channel, once in about a hundred times it will come up to his worst fears. Everyone starts out on the journey with fear and trembling, and nine times out of ten his fears will prove groundless.

I have tried a dozen times or so, and but once found it even rough, and yet we, like everyone else, always dreaded it, though it was without cause, but, as is the usual experience, a number will be sick, even though the sea is as flat as a mill pond; it seems they are bound to do it.

We left Brussels about 10 in the morning, with the usual fears, crossed from Ostend to Dover, and reached London at 6 at night easily enough, in spite of the useless worry.

While we had been on the Continent, the Blackwall Tunnel had been put in working order. We took a look at it, and found it well worth seeing. There are several tunnels under the Thames at London, the old Brunel double brick, of horse shoe section, originally built for or at least used by pedestrians, but now a double track railway; a five-foot round tunnel for foot passengers; a round cast iron lined, for the electric underground road, and this latest which may be of cast iron, but is lined with cream-colored brick. It is truly circular in cross section, 18 or 20 feet in diameter, with the lower part filled in to within four or five feet of the center—this for the pavement, wide enough for two of the largest drays to pass—and two narrow sidewalks. Two or three things are conspicuous about it, as compared to other tunnels. The incline at the north end is on a curve (the approach being as near parallel to the river as at right angles to it, I should judge), and the marvelous accuracy and perfection of the workmanship. Every point is as true to its intention as any building, and I could not detect a single leak throughout the entire length. Water entering the approaches in a rain storm is unavoidable, and has to be pumped out. The tunnel is tight, and is a beautiful piece of work. Some writer in a New York paper says it is two miles and a quarter long, but I guess he got mixed. A mile is nearer right. Unfortunately, it is a terror for noise; a single wagon or a half dozen lads will make noise enough for a political meeting, and have some left over. I believe this is aggravated by the curve at one end, the circular cross section and the smooth surface; but as a piece of workmanship, I hope every architect and engineer, civil and mechanical, who visits London will take a look at it—and yet, after all, if they only remember the noise, and ignore the engineering achievement, perhaps they will wish they had not.

At the new works of the Willans & Robinson Company, at Rugby, I found Eaton Shore, the works manager, still working out new ways to do things, and he, like many of the rest of us when setting our hearts on doing a thing or making a thing go, hates to be beaten. He, like many another, dislikes to concede that if you have a round job to do, a lathe is not the machine to do it in. The problem in hand was that of making piston rings, and in a test between a lathe and the Richards machine made expressly for the purpose, it was found that the special machine could gain over the lathe only in cutting them off; simply because the machine was provided with two cutting-off tools, and this led Mr. Shore to design a new cutting-off tool, which, so far as I now remember, was something like Fig. 1.

The body of the tool is held in one form of the English tool post; it will be seen from the cut that it is adjustable for different size rings, a set screw to determine the width of the ring, a facing tool and the rig properly set by bringing the cut-off tools against the face of the ring. I presume I have not gotten it exactly right, but this gives the idea. With this rig the rings are made as quickly as in the special machine, and where one has not rings enough to keep the special machine busy, it is not convenient to employ it on other work. My own idea was that the saving in time by the special machine would be in setting the work.

Both with the special machine and the lathe, the castings from which the rings are cut are bored and turned at the same time, when the rings are parallel in thickness, and Mr. Shore is devising a rig to apply to the lathe to bore and turn the eccentric rings inside and out at the same time as well; this he will be able to do on the lathe, and not on the special machine.

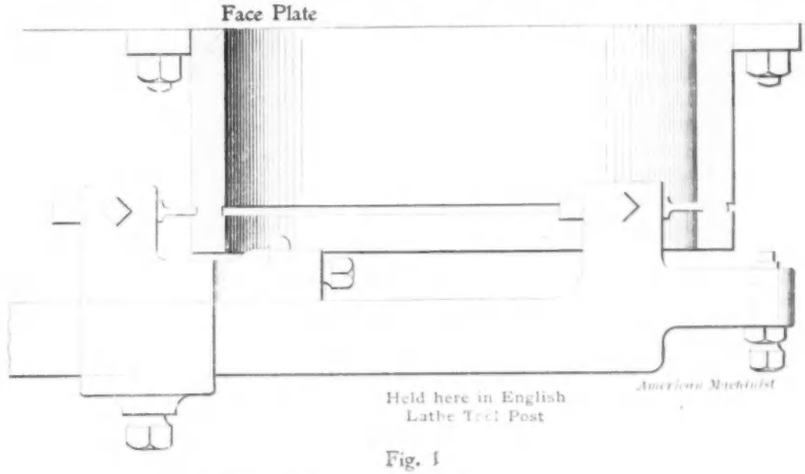

Fig. 1

TOOL FOR CUTTING OFF PISTON RINGS.

The new works about which I made some remarks in my second letter, appear to me, on going through them, which I did not have an opportunity to do before, to have too much money expended in classical architecture which had better, in such a place, go into machines—not that I would ignore the looks in a workshop more than I would the work turned out of it, but there is a way to get good looks out of simple rigid simplicity appropriate to a building for such a purpose which is, in fact, more appropriate than that which would suit a city hall. And another thing that struck me as peculiar—the provisions for office help; the offices and testing department seemed to me to be almost half of the place. I doubt if there is, any-

where in the world, another testing plant half as complete or expensive; and now that the engine has reached its commercial perfection, and what would seem a fixed standard, the question at first occurred to me, Was there necessity for such elaborate testing? But the practice with this company is, to have the dynamos sent to the works and mounted, and the plant tested as a whole, a large percentage of their engines being, I should judge, used for electrical purposes. A question brought out the reply that the variation in a set of standard engines would not show a greater variation in water consumption than from 1 to 2 per cent., and when I came to think of it, these questions came up: Whether that 1 or 2 per cent. was in the engine or in the test? How long the engines would have to run before the difference would disappear? What one could do to find out the cause? and what proportion it would bear to the difference in boilers and stokers?

At Manchester I crowded in a few hours with great satisfaction. At the works of Hans Renold, whom, unfortunately, I did not meet, but whom I know to be a champion of American machinery, I found, under the guidance of the second in command, good reason why he should find our machinery suited to his purpose, and why he should like that of it that is good. He is a great genius himself, full of cute dodges and a designer of special machines; and, like all true men of genius who have not got the big head (and the good ones seldom have), he cannot help but admire the good things done by others. Nowhere have I seen a more systematic aggregation of devices and processes for successful manufacture; but then his business—that of making pitch chains—is one that admits of it. Though he makes perhaps a hundred or two different kinds, each chain in itself is a thing having very few different shaped pieces; not to exceed a half-dozen in any case, but hundreds and thousands, yes, and perhaps millions, in some, alike. In such work no amount of tests is too costly, if it will secure uniform work; no device too expensive, if it will lessen the time in work; nothing extravagant that will maintain the standard of the work. His success has been established by making a pitch chain that will run smoothly.

They are having a circus in starting up a new American machine tool, built by a firm that I know to be first class, and I mention it (though informed that they did not point out the defects to have mention made of it) for the purpose of showing how often little things will count bad against, and are liable to happen to the most careful. The defect was in a scroll chuck, and when the machine was being unpacked or erected, the builder came in, and his attention was called to what the foreman thought was a defective construction. The builder remarked, "I tell you that is made as perfect as possible," or words to that effect, so the foreman shut up, and when he came to use the chuck on a certain sized piece, the threads began to crumble off the scroll. Upon investigation, it was found that only one tooth of the jaws had a bearing at that particular diameter, so they were hard at work scraping the scroll to pitch. It is only necessary to use a lathe with a worn cross feed screw to produce just this sort of thing; in fact, a lathe to make such a scroll needs to be something better than ordinary.

One feature about the chains made by Mr. Renold, for bicycles particularly, is that the tenons on the pins are forced fits. In other words, the chains, when assembled, were complete without riveting, although the pins are riveted as a secondary precaution.

As Mr. Renold has shown good sense in putting in American machine tools to do the work of his class, so, too, has James Vose, superintendent of Meldrum Brothers, shown equal sense in getting tools adapted to his work, which is of an entirely different class, and among other things a lathe made for boring where the work is such that nothing but a lathe will do, and this was nothing but an English lathe with the English part emphasized; a very wide cross slide and the barrel of the tail stock reaching over a foot to compensate for the room taken up by the wide slide.

This was an extreme case; but we keep on ridiculing the four-bolt tool post, and yet every American machine tool builder who builds modern strong lathes adopts it; but why none of the builders (with one exception, perhaps) who are from time to time bringing out "their new design of heavy lathe," do not widen out their cross slides and project over the casting to support the tail spindle (which itself must project so far anyhow), is more than I can understand. This casting should overhang the cross slide half its width anyway, whether they are made wider or not.

I could not help but notice another special feature in the few shops that I was in—the continued use of the inserted tools and the great variety. The inserted tools were no uncommon thing in England thirty-five years ago, and with us there have been here and there some smaller tools for special things, such as cut-off and threading tools; but these special inserted tools of fine steel secured in rigid holders have held their own and made their way in England, until now they are common enough, and the whole cause of the difference in the outcome has been from the fact that, from the start, the English made the holders to hold. The English tool post would hold a mass of metal, so the holders, which never have to be made but once, are made good, and so strong that spring is eliminated, and it is spring that dulls tools. So long as they do not spring, they do not dull, and while they keep sharp they do not heat. The claim that the inserted tool is not as good as the solid one because it does not carry away the heat so fast, is more than made up by the inserted tool's holding its edge; I mean, where a proper holder is used.

Mr. Vose shows a mine of cute devices, his work varying from boiler fronts to some very good work on their specialty, jet blowers. As the English gas pipe thread is 12 to the inch, if I remember correctly, he uses 12 threads for all sorts of things, finding that gas fittings will come in handy to do the most inconvenient sorts of jobs. He uses circular disk chasers for cutting threads, finding that when with a single tool he would have to grind four times on a certain job, the chaser will do four jobs at one grinding.

Single V circular threading tools have come up and flatted out many times with us, but this chaser s ems to justify its existence at least in the Meldrum Brothers' works, which, by the way, is the Atlantic Works of old, which John Richards & Co. rendered sacred to me.

A new arrangement of independent chuck jaws for face plates, which are as good as any for any work, and better for some, are made in this way: instead of being tongued into the slots so as to always stand radial, they are flat-face, and can be set at any angle, and, besides, the ribs on the back of the face plate are cast with perhaps ¼-inch pitch ratchet teeth, and the washer made to match, so that such a thing as sliding back when the jaw is set up to the work, is not possible.

The present business has been built up by the combination of two elements—a carefully conducted series of experiments, which determined that, to get the best results from a jet blower, the jet must be truly central and located in just the right position, and the other element centered in James Vose, who had sense enough to put in tools just good enough for the job, and know how to get the work out. A good business made out of what appeared to be an unpromising one.

At the office of the Globe Engineering Works, I learned from the manager, Mr. Brown, that they had built up a trade for the sale of aluminum that amounts to a hundred tons a year, and I met Mr. Birch, the builder of the best amateur lathes in the world, which do about everything but make money, and come pretty near doing that, as he showed me a reproduction in wood of a medal, about the size of the exhibition sort, in which every detail, letters, figures, bust and border, appeared perfect. Carving medallions on a lathe was a new thing to me, and yet it appears all right when one knows how it is done.

At the works of Alfred Muir, they were, like the most of the engineering establishments throughout England, running a kintergarten or trades-school shop, as what is known as the engineers' strike had then been on for some months (the engi-

neer in this case meaning what the word "machinist" does with us). A large establishment run by apprentices has to go slow, and yet work was going on, and helped to confirm the point that I have been for years contending—that boys in a trade school could learn a trade as well, or better than in an ordinary shop, provided the school was carried on like a shop, except that it would be for the purpose of giving the boys a chance to learn the trade, and not for the purpose of making money.

While the works of Muir are, and always have been, general machine tool works, they have run more into milling machines than others. One machine of their own make, still at work, is fifty years old, and they have been building milling machines for the market ever since, and were, at the time of my visit, at work on a vertical spindle milling machine of the planing-machine sort, 9 feet wide by 20 feet length of bed. One point they put great stress upon is, the enormous depth of cross rail, and also the extremely wide posts for their regular milling machines. So far as the fact itself is concerned, they are right; but in my opinion, the way they carry out the plan, they are dead wrong. Take the case of the cross rail; the depth is all right for strength, and all right for giving a long support between the bearings of the main spindle, but their spindle slide or head is short on the cross rail and guided with a V on top and bottom, which, for even a planing machine, is not right, and the strains and wear imposed on one of these machines where it has a cross feed (and one is of no account without) are entirely different. The strain is as great and more constant sideways than backwards; the head has to work under strain, and the small wearing surfaces, when subject to such usage, are entirely too short-lived; and again, the two guiding surfaces wide apart, are all wrong; then, too, the result from the springing of the top and bottom due to the cramping of the head under side strain, is much worse than where the head is guided from the bottom only.

It is only necessary to recollect the great guiding surfaces furnished to guide the bed, and the little for the head, bearing in mind that, except in weight, one has as much work put on it as the other, to become conscious of the absurdly small guiding surfaces in ordinary vertical milling machines of the planing-machine sort.

I was surprised at the marvelously quiet running of the cast gearing in their machine tools; I simply cannot understand how they can do it, and the more so when told that the patterns are not drawn through a stripping plate. A new, very large radial drill, with certainly as many bevel and miter gears as usual, was being started up for the first time. It did not run still, but not worse than our radial, which is of a smaller size, with all cut gears, and built by one of the best makers, after having run now four or five years.

The large specially accurate gear, of which you mentioned and described the method of cutting, had just been finished. A specimen of milling, which had been done years before, showed that milling metal into shape, and that, too, in good-sized pieces, was no new thing to them; and then the other fact, that such a place had been built up, or had built itself up on its merits, without advertising or the publication of a catalog, was rather a consolation to me. Well! I just wonder if they have not saved as much in printers' ink as they have lost in trade. This is certain—they still exist, and stand as one of the leading tool builders in England, contrary to the oft-repeated claim that there is nothing like printers' ink.

A sixty-minute journey landed us at the Cunard dock in Liverpool; a six days sail on the Lucania, in New York; and a six hours' ride to Syracuse, the place of our destination, which we had hoped to reach by way of Japan and Vancouver.

In crossing the Atlantic we found that even a 625-foot ship could pitch an inch to the foot each way, or the bow go up or down 100 feet at a swing. We were glad to have our ideas confirmed by the captain's log, wherein he reported it a "rough sea."

We hope sometime to be able to resume the journey at Berlin, whether I do these letters or not.

JOHN E. SWEET.

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As Others See Our Naval Engineers.

"Engineering," of London, discusses in a recent issue the status of our American naval engineers, and refers to Prof. Hollis' article, upon which we have previously commented. Speaking of Prof. Hollis' reminder that conditions of naval warfare have changed, our contemporary says:

"Now, it would hardly more enter our heads in this country to emphasize this fact than it would to state that the Household troops are no longer armed with bows and arrows, yet we organize the personnel of the navy very much as if James Watt had never lived and we were still in the glorious old days of 'Nelson, Hood and Collingwood," when ponderous three-deckers sailed leisurely into action, and then lay, yard-arm to yard-arm, blazing away for hours until one or the other had enough of it, or there was a chance to board and settle the matter out of hand. In frigate actions it was somewhat different; but, heroic as these generally were, they constituted only the skirmishes of the seas, and had but small influence on the fate of nations. But even if the "motive power" had played ever so important a part in the decision of sea fights, the difference between then and now is that formerly the executive officers were thoroughly masters of the whole "mystery" of the propelling agency, whereas nowadays a captain in the engine-room is about as useful as a marine at the weather earing. So far as we can judge, our emancipated and non-aristocratic cousins in America are little if anything ahead of us in this matter, and perhaps Mr. Hollis does well to remind Americans that they have a steam-driven navy."

In reference to Prof. Hollis' review of the historical part of his subject, and of the fusion which took place between the sailors and the fighters of the English navy, four hundred years ago, "Engineering" says:

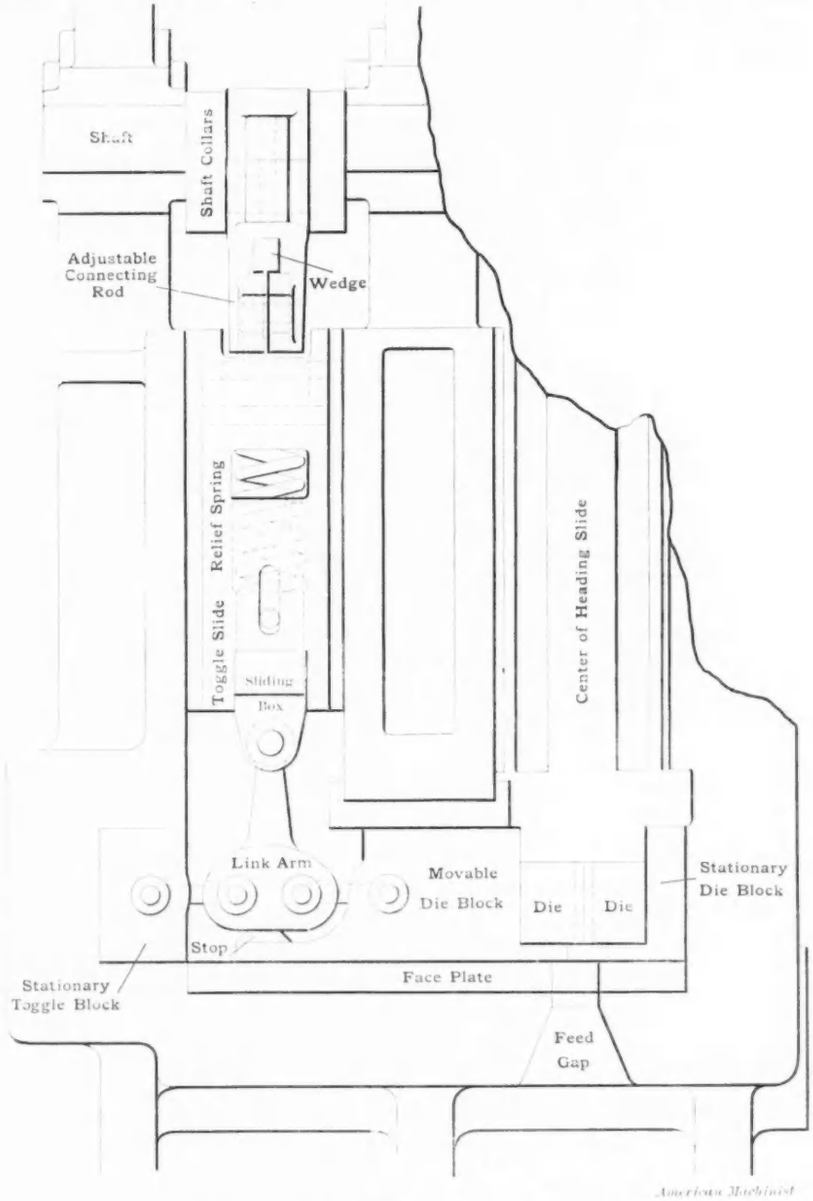
"It was in virtue of this 'fusion' that England gained the mastery of the sea, and to it Mr. Hollis very rightly attributes our victories in the Elizabethan era. Our fleet was entrusted to sailors—Drake, Hawkins and Frobisher—whilst the Spaniards clung to the ancient system of soldiers in command. 'The poor equipment of the Spanish ships (of the Armada), and the ease with which they were rounded up, like a herd of cattle, forms one of the most melancholy pages of history,' says Mr. Hollis. Englishmen naturally take rather a more cheerful view of the matter, but that does not affect the argument. Nothing, however, is easier than to misapply the teachings of history, and it by no means follows that because the navigating sailor and the fighting man of 300 years ago could be 'fused,' that the captain and chief engineer of the present day can be welded together with equal success. The whole tendency of modern advancement ashore and afloat, is towards specialization and division of labor. The problem of civilized existence is so complex—there are such vast stores of accumulated knowledge to be acquired, that life is not long enough to enable a man to become efficient in more than one branch. In the yard-arm days there was one sort of gun, one sort of gunpowder, and but few sorts of shot. Small arms—smooth-bore, pike and cutlass—were equally simple. Navigation was not more difficult to master—it was more uncertain in practice—than it is in the present day; but now we specialize into gunnery lieutenants, torpedo lieutenants and navigating lieutenants, with whole systems of sciences to learn, and, furthermore, a science of naval strategy and tactics such as the mast-and-sails commander never dreamed of. Even in the sailing days the manoeuvring of the ships was left to the master, who remained as a relic of the old struggle between sailor and soldier, to which reference has been made.

"So much may be said against the 'fusion' scheme Mr. Hollis proposes, but the objections are by no means final. In support of his suggestions it may be said that, with the exception, perhaps, of strategy and tactics, the whole duties of the executive officers—gunnery or tor-

pedo—are based on engineering science, all branches of which have a common foundation of elemental principles; and even strategy and tactics depend on the machinery department. Whether, therefore, the complete naval officer—at once steam engineer, gunnery expert, torpedoist and navigator—be possible is the question that has to be solved. It is no good for him to get a smattering of steam, just enough—as some now have—to make himself ridiculous. He must go honestly through the mill, and know his engines and boilers as he knows his guns and torpedoes, and that is a question of time. We cannot afford to have naval officers growing into old men before they have learnt their business.

"Whatever training the commander of a ship may go through, there is one thing certain: his place in time of battle cannot be in the engine-room. Therefore the captain of the ship can never be, at the same time, the chief engineer, whatever his previous training and his engineering accomplishments may be. If, however, the captain cannot be the engineer, the engineer can become a captain; and, indeed, the present regulations which puts an engineer officer under the orders of a gunner or a boatswain, in absence of a commissioned executive officer, is an anomaly which should speedily disappear.

"There is one other point to which we would make reference, although it is not dealt with in Professor Hollis' contribution, before concluding this article. We refer to the question of titles as apart from rank. In our own navy all engineers, from the engineer-in-chief downwards, have no title or designation in virtue of their office, standing on the same platform as ordinary civilians in this respect. In the United States it is somewhat different, as there naval engineers holding high office are allowed combatant titles; for instance, the chief engineer of the United States Navy is known as Commodore Melville. At first sight this seems a small matter, and for our own part we have always considered the profession of the engineer so honorable that it carried distinction sufficient in itself. In the navy, however, there is doubtless more to be said, especially in regard to vessels serving abroad. In foreign countries it is customary for naval and military officers to be addressed by the name of their rank; that is the distinguishing mark of 'an officer and a gentleman.' If, therefore, a naval lieutenant and a naval engineer are in foreign society, and the engineer is simply Mister Jones, whilst his brother officer is Lieutenant Smith, the former gets very small consideration, and no doubt people often wonder whether he has any right in the drawing-room at all. This is annoying even to the most philosophically inclined engineer, and though those not subject to the same disadvantage affect to make light of these matters, we have noticed that captains, and even admirals, are not over-pleased if their rank is forgotten. The fact is, the great inducement to the majority who join the combatant services is not the prospect of high pay and material advantages, but the honorable distinction and social prestige attached to the holding of a commission, and of this the military prefix is the outward and visible sign. As there are gunnery lieutenants, torpedo lieutenants, and navigating lieutenants, why not engineer lieutenants? It is said the engineer is not a combatant; that is a fiction. The whole war-ship is a weapon of offense, and in handling the engines the engineer performs an act of fighting below as much as the captain does when he works the telegraphs in his armored conning tower on deck—especially if ramming operations are in contemplation—or as the torpedo lieutenant does when he directs the operating of a submarine torpedo discharge, also below the water line. The engineer officer wears a sword, and we should like to ask whether, in the case of his ship being boarded, he would be expected to tamely submit to his engines being interfered with by the enemy so long as the colors were at the mast."



IMPROVEMENT ON A FORGING MACHINE.

An Improved Forging Machine.

The Acme Machinery Company, of Cleveland, O., have been making some improvements in their well-known bolt heading and forging machines. In addition to such minor improvements as would ordinarily be suggested as a result of experience with the machines, they have made at least one change of considerable importance, and this is shown by the accompanying engraving.

It is called the "automatic relief and adjustable time device," and consists of a spring in the slide that moves the links

that in turn move the gripping dies to the closed position. As the motion begins the spring has the least power, but as the motion continues, the power increases owing to the position of the links, which form the toggle joint system; the centers being practically in line at the moment when the dies are closed. It will be seen at once that if the stock, being fed to the machine, should get caught in the dies, or if an accident happens such as a wrench falling between the dies, the spring will yield and the toggles will not lock or come to their centers, and thus the machine is relieved of undue strain.

In addition to the office of the spring as a relief, it is also an adjustable time device. By time device is meant the time that the dies close and remain closed in relation to the advance of the heading plunger. For instance, if rivets and small pieces are made it is necessary for the dies to remain closed an instant only. In making larger work, where it is desirable to gather more stock into the upset, the pitman that closes the dies may be lengthened by setting up the spring, means for doing this being provided, so that the spring will compress as the machine goes over the center and thus the dies will remain closed longer, the first eighth compression giving ½ inch more stock in the upset and the second eighth giving ¾ inch more stock in the upset, and so on to the limit beyond which the material only folds into cold shuts. Thus it will be seen that in addition to the relief being automatic, the time which the dies shall remain closed is adjustable to suit conditions. The machine as now constructed consists of fewer parts than formerly, is more convenient to operate, and is more thoroughly self contained.

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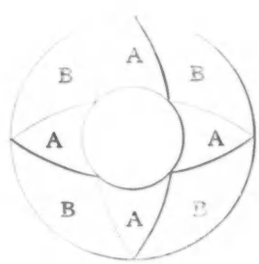
Letters from Practical Men.

The Almond Engine.

Editor American Machinist:

In answer to the criticisms of my rotary engine, made by "Quirk" and Wm. K. Austin, in your issue of November 18th, I would beg the latter gentleman to spare his compliments, or I may be too much handicapped by my excessive modesty, and be overcome before the engine is completed. I really must ask him to "draw it mild."

"Quirk" objects to the disk valve. I have the impression that disks, if properly made, will not wear out of shape. Suppose we cut away portions of the surface, as shown by letters *A A* in the cut, leaving the surfaces *B* for rubbing contact. Will there not then be a compensating tendency as to wear? In the engine the ports and port holes correspond to the cut-away portions *A A*. Four months' continuous running with valve faces held gently together by steam pressure, shows no line of light when the valve faces are tested by a straight-edge. The construction of these valve faces is not quite the same that "Quirk" may have had in mind, and which has been the cause of so much trouble in a large number of engines, where it is important that such faces should maintain their shape. As to the unbalanced condition of the revolving cylinders, I can only say that the engine tested at Stevens Institute stood on a table 3 feet high and 3 feet across the top, and, at 500 to 600 revolutions, gave no indications of being unbalanced. A smaller engine of about 2 horse-power runs without vibration at 1,400 revolutions, with nothing but its weight, 35 pounds, to hold it in place. The criticism in regard to the pressure in the shoes not being in line with the piston, is to the point, and further experiments will probably locate the trunion which connects the shoe to the piston, farther back. This indirect pressure at the beginning of the stroke, is acting during a more favorable position of



EQUALIZED WEAR OF VALVE FACE.

the piston; as at this point the piston movement is comparatively slow, and the guide-way long.

"Quirk's" last objection, "but not the least," will be found to be less of an objection when he becomes better acquainted with the construction. The engine described in your issue of November 4th, has four pistons 4 inches in diameter; the travel is 3 inches; the cylinder ports are round holes 1¼ inches diameter, and the holes through the shoes are 1-32 inch in diameter; a ratio of, say, 1,500 to 1. Will "Quirk" state relative quantity of steam escaping through small hole in piston shoe, when engine is running 400 revolutions, even supposing that it escapes freely into the atmosphere? As to the pressure produced by the centrifugal force of the pistons, this may be provided for on one side of the engine, by properly proportioning the area of cavity in shoe to the area of piston. "Quirk" has failed to mention the one thing that has given me the most trouble—i. e., lubrication. I am pleased to say that I am now running one of these engines, oiling up but once a week, and I can arrange to run for a year with one supply of oil, if the occasion should arise.

Mr. Austin will finally decide that this really is a rotary engine, notwithstanding the reciprocating of the cylinders (?), which, by the way, do not admit steam 1,600 times per minute, but only once for each revolution; and although he sees no way of taking an indicator card, I will suggest drilling a hole through the shaft as far as one of the cylinders, and thereby ascertain if the engine is "capable of being nicely adjusted to run fast and smoothly."

The question of automatic cut-off, inertia governor, etc., has arisen. In a short time I shall have to ask your further indulgence, being anxious to add the "missing link," for the inspection of the gentlemen who contribute so much to our pleasure through the columns of your paper, which for twenty years has been to me a source of profit, both as reader and advertiser.

T. R. ALMOND.

Brooklyn, N. Y.

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The Balance of the Almond Engine.

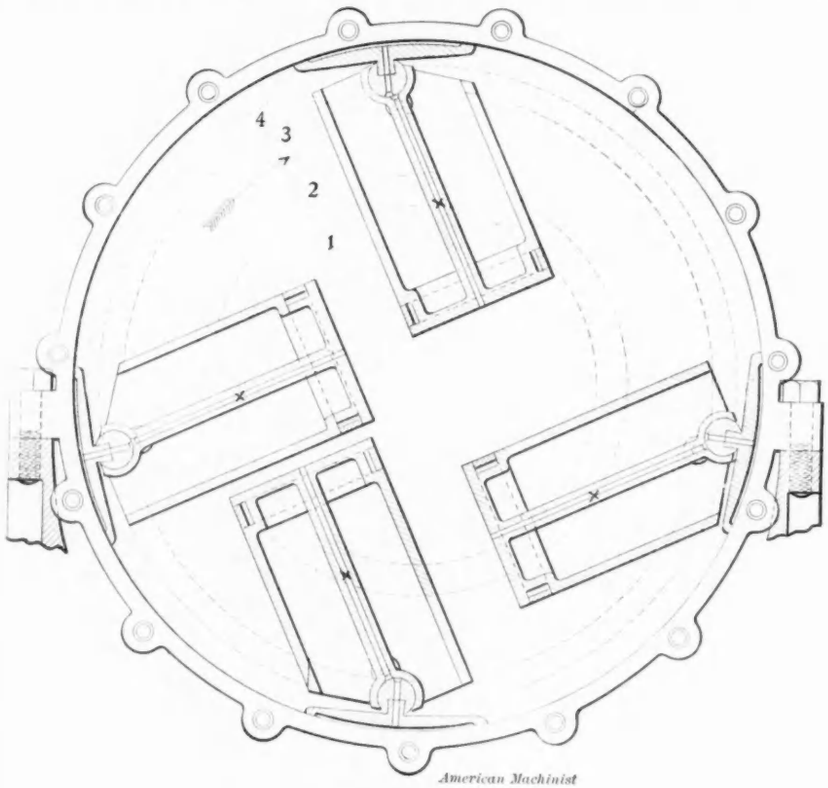
Editor American Machinist:

I, like some others that I know of, have been having a little circus with the Almond engine, which you brought to our notice in your birthday number. I happened to be in New York, before that issue came out, and as I had a little leisure one evening, I quite naturally went to the fair of the American Institute, and while there I caught on to the Almond engine, and I got the full value of my admission ticket out of it, so that I did not lose anything by going. The engine was put through its paces for me, and run at various speeds, up to very high ones, and I must confess I was unable to reconcile the smoothness of its running at all speeds with the apparent lack of balance in the rotating parts, as I then understood their operation. A diagram similar to that which appeared in the "American Machinist" was exhibited in connection with the engine, and from that I got my ideas.

Of course the bunch of cylinders, taken alone without the pistons, is perfectly balanced; but considering the pistons with the cylinders as a single revolving body, the case is very different. With the piston as far in as it will go, and the opposite one as far out as it can go, there must of course be a very unbalanced state of affairs. Then, as the thing went around, there would also be a complication on account of the centrifugal force. Starting with piston *A* at the bottom, the piston, while running up the left side of the circle, would have an easy time of it. While going up that side it would be sliding out of the cylinder all the way up, so that the centrifugal force would help it as it went along. But when it came to going down the other side, the trouble would begin. The centrifugal force would of course be acting the same as before, but the piston would have to be shoved back into the cylinder in spite of it. Of course the pressure of the shoe against the case must be very great while this was going on, and this

would seem to be the most objectionable feature of the engine.

After all, I found that it was a false alarm, and that no such state of affairs exists in the case. When I made a sketch of the shell and the pistons, and without the cylinders, just as I show here, I soon realized how the thing was. These pieces have really nothing to do with the shaft as a center of revolution. Take the shoes, for instance. It is evident that they do not travel in and out on the circumference of an eccentric, as I had assumed, but that they simply travel around in a circle, and



THE BALANCE OF THE ALMOND ENGINE.

are, of course, perfectly balanced at all times. So with the pistons; they being attached to the shoes and moving around with them, they also would be perfectly balanced at all times if they did not change their angle. This change of angle has a certain unbalancing effect. If we assume the points that I have marked with little crosses to be the centers of gravity of the several pistons, it will be seen that these points move in and out within the range covered by dotted circles 1 and 2, or only about one-quarter as far as the piston travels in the cylinder.

There is for even this little range of in and out movement a partial compensation, if, indeed, it might not be made a perfect one. It will be noticed that to allow the piston to clear the shoe, one edge of it has had to be cut away. Now, if we notice the long, or opposite, corner of the piston, we see that, as the body of the piston or the center of gravity of it swings outward, this long corner swings inward. The range of this movement, as indicated by dotted lines 3 and 4, is not less than that between 1 and 2, and the circle being so much larger, the variations of centrifugal force should be much greater for equal masses. It might be possible to load this lip of the piston so that its change of radial position would entirely and perfectly compensate for the movement of the body of the piston. The engine, however, for anyone who has seen it run, does not seem to need any balancing. There are some other curious points about it that are still puzzling me, but it will not be best to drag them out at present.

MORRIS FULTON.

Philadelphia.

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White Lead and Oil for Bearings.

Editor American Machinist:

Under the heading of "Lubricating Crank Pins and Bearings," I am pleased to note how clearly Mr. Renwerk deals with that question, and to strengthen his claim regarding the merits of white lead and oil would say that I have used it for the past six years, and have had the best of results with it.

On high and low speeds, heavy and light bearings, I notice that the bearings wear smoother and more even, and last twice, and in some cases three times, as long as with oil alone.

What first induced me to use lead and oil was a hint from a watchmaker, who told me how to make an oil that would not gum up. His plan was to let thin sheet lead stand in the sun in sweet oil for a couple of weeks, and then pour off the liquid and use.

But that was too costly, so I used white lead and common oil, and got a lubricant that did not gum and always ran cool.

A BOSTON TOOL MAKER.

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The Safety of Elevators.

Editor American Machinist:

I have read with some interest your editorial of October 28th on the safety of elevators. The first suggestion which you offer is with regard to the safety devices themselves, your suggestion being that the safety catches should be normally on and require to be released before the car can move. An apparatus of this kind would be theoretically desirable, but would still require an important factor which must normally remain inactive and not be called upon except in case of emergency. You will realize that a safety device which shall be normally active and require to be released every time that the car is started, must necessarily be operatively connected with the operating mechanism in the car. Some device (the present form of speed governor would answer) would then still be required, which would release the connection between the safety apparatus and the operating mechanism automatically in case of emergency. You would then have practically the same principle employed which it is the practice of the best manufacturers to follow at this time, but with more complication than is found at present.

What is desirable, and is furnished by a few of the leading manufacturers of elevators in this country, is a device which will enable the operator, should he find the car beyond his control, from any cause, to throw the safeties into action from inside the car; this device, of course, being in addition to the automatic features which are an essential part of all safety apparatus.

What is, perhaps, a better reason for the numerous accidents which have occurred lately, is that the speed governors are set to throw at from 600 to 1,000 feet speed per minute, and this setting of the speed governors is made necessary by the inordinate demands of the average architect and owner, who think that high speed means increased service, and who, in my experience, I have generally found were entirely ignorant of the fact that more people can be carried at a speed of from 300 to 400 feet per minute than at higher speed. This fact has been demonstrated by actual test. It is also a fact that when machines are designed and built to run at the ridiculously high speeds demanded, they are generally slowed down, so that they can be properly handled, and it is equally true that

in the majority of instances where this is done, the speed governors are not slowed down. Furthermore, with speed governors set to throw the safety devices into action at such high velocities, the action of the safeties themselves in bringing the car to rest is such, as in a number of instances on record, as to cause injury to the occupants of the car. This is simply a repeition of the case of the Irishman who fell from the top of a building—it was not the fall that hurt him, but the "stopping so quick." You will realize that it will require quite a number of feet fall of a car to acquire speed sufficiently high to throw a governor such as I have described, and, as is the case sometimes, the car has not a free fall, but is held back by the counterweights and ropes. This point you have commented upon in your issue of October 28th. It would seem, therefore, that to obtain more safety, we should build machines more reasonably.

I am surprised to note the reference which you make to the alleged safety of the air cushion. The air cushion, theoretically, is a perfect safety device; practically, it is wellnigh valueless. An air cushion properly designed must meet the worst condition with which it can be presented, viz., the car loaded to a maximum, falling from the top of a building. An air cushion designed for this condition, and operating under this condition, will stop the car quite as well as we could wish for. Unfortunately, however, we cannot always arrange an elevator accident in just this way, and should the car fall from an intermediate point in the hatchway with a load less than the maximum, the air cushion is quite likely to send it flying back up the hatchway, and the subsequent fall is disastrous. I made, some years ago, a series of tests upon air cushions to demonstrate this fact, and found the conditions and action of the air cushion to be just as I have described.

Your remarks with regard to the safety of freight elevators are hardly applicable to elevators of modern design, in that the freight elevator of the best manufacture in this country does not employ the obsolete rack and spring for the safety, but has a wedge or other form of friction catch acting upon a steel or wooden guide, and thrown into operation from a speed governor. [Our remarks applied to elevators that are still all too common.—Ed.]

It is unfortunate that the purchasing public will not always see the benefit of a larger investment in first cost to obtain well-designed and well-constructed apparatus, in place of badly designed and badly constructed machines at less cost; the latter being the cause for many accidents on freight elevators.

I will close with a hearty endorsement of the concluding words of your editorial, to which I am referring, which are, in effect, that it is through legislation that we can perhaps best hope for relief. The law regulates the speed of our railroad trains, of our trolley cars, of our horses and wagons and of our bicycles. Why should it not regulate the speed of our elevators? Common-sense and a proper sense of responsibility demand that our express trains shall have in the engineer's cab a man of experience and responsibility. The passengers in a common elevator entrust themselves generally to a boy. Legislation should regulate the age at which an elevator operator may take charge of a passenger elevator, and this man should properly be licensed. Legislation can and should demand that certain essential principles relating to the safety apparatus shall be included in the design and construction of every passenger and freight elevator, that these fixtures must perform certain distinct and specific functions, and competent (mark the work) inspectors should pass upon every elevator constructed and issue a certificate before it should be allowed to go into service.

KINNERLEY BRYAN,
Manager Elevator, Lept. Howard Iron Works.
Buffalo, N. Y.

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Stiff White Heat.

Editor American Machinist:

I have read with much interest the article by B. F. Spalding, "Hints About Iron," in the issue of November 11th. In about half an hour I encountered for the first time the phenomenon called by him a "stiff white heat." The attempt was made to twist a square bar with the result shown by the photograph I send you. I was sure the center was the hottest part

EFFECT OF STIFF WHITE HEAT.

and yet see that twist!! A second attempt was more successful because the whole part to be twisted was allowed to cool down to what the previous experiment had indicated to be the temperature at which the metal would yield most easily. I must say that on reading the article I was inclined to be skeptical, and don't know but what I am so still, but at any rate, this special case can be most easily explained by agreeing with Mr. S.

C. P. BENNS.

New York.

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The Russian versus the Swedish System of Manual Training.

Editor American Machinist:

In the American Machinist for October 28th, in his story of "The Place of Our Destination," Prof. John E. Sweet makes some comments on the Russian system of manual training in comparison with the Swedish sloyd. His opinions are given at too great length to quote in full. Of the Russian plan he thinks that "The system holds out false hopes," and, further, "I am very sure that I believe the Swedish system by far the best."

The process of education can never be reduced to an exact science, nor all minds trained in precisely the same way. Differences in individualities—the personal equation—prevent. Of this fact Prof. Sweet is undoubtedly well aware. Had he taken the time to inquire into and to analyze the economic and educational conditions of Sweden as compared with those of the United States I can hardly believe that he would have made the sweeping assertions that he has.

For centuries the Scandinavians, as well as the mountaineers of the Alps, have worked at wood carving and allied manual arts as a means, either as a whole or in part, of earning a livelihood. Wooden spoons, forks, plates, handles for tools, shoes, and other articles of utility or ornament, are still made by hand for sale. The making of wooden toys is also carried on by the people of those countries. The more artistic of the workers are able to carve chairs, stools, easels, articles of furniture, and bric-a-brac which they sell at ridiculously low prices to tourists, and from which no small part of their income is derived. The occupation of the parents for generations in one line of work has had the inevitable effect of producing a type of people nearly as distinct and pronounced in their characteristics and peculiarities as the Hebrews. As with the standard bred colt, by its dam to flee from danger at a trot, the city-bred pointer-dog, that has never been in the fields, to point sparrows, or the game cock to fight until victory or death, so comes the instinct of the mountaineer boy to whittle out an image of the chalet carved by his father, simply the result of inherited tendency, training and imitation. It is easier and simpler to teach a class of children in a school than singly at home, and so the sloyd schools are developed; just the thing for children destined to earn their living by making the very articles they learn to make in the school.

In the United States we labor under totally different conditions. We have no use for wooden spoons or forks, and wooden shoes cannot be profitably made by American hand labor. Our systems of manufacturing processes vary widely from nearly everything prevailing in Europe. The children in our schools are of a different type—in fact, we have no prevailing type as yet, for all grades and classes in our schools come together on the same footing. It is illogical to teach jack-knife carpentry, for American practice is different. The best thing that we can do is to teach the various uses of the seven hand tools as quickly and as simply as possible, and then to teach the applications in a practical way.

All the fundamental principles of carpentry may be taught in a series of twenty

graded exercises, after which the boy or girl—for girls can do just as well as boys, where they have constructive capacity—will be able to do a better and more satisfactory piece of work involving the principles than they could possibly do by attempting to learn the principles and their practical application at the same time. The same amount of work will be done in less time, too.

The "useful products" idea always cuts a great figure in the arguments of sloyd advocates. It has great weight with me, also; but when the "useful products" consist of wooden spoons, boot-jacks, clumsy garment holders, towel-racks, etc., which are not useful articles in this locality, I fail to see the value of making them. To my mind, they are, whenever they involve two or more similar processes, of less value than the simpler exercise teaching the application of but one new principle. A boy will work with great enthusiasm in the construction of a hand-sled; he will not be very enthusiastic in the use of it, if it is his first attempt, and he is unskilled in the use of tools. It requires considerable skill to make a really good hand-sled. As to violins, mandolins, guitars, etc., I have yet to see a tyro who was really proud of his first production in this line—if he was a musician.

The most eminent advocates and teachers of sloyd in this country have very materially altered their courses of instruction since it has been introduced. In fact, it has been brought as nearly as possible to being manual training, and still remaining something else. In my belief, it is a waste of time and of energy, and a wrong as well, to teach roundabout, obsolete processes, when shorter, better and common methods may be observed in practice within a stone's throw of the school-room. It is wise to give common and practical problems for solution in arithmetic classes, but no sane teacher starts a beginning class or pupil with the real work of a cashier or bookkeeper; yet that is arithmetic of the most practical kind, and involves all of its principles. No teacher of a beginning class in chemistry gives samples of commercial products, in the expectancy of securing results of practical value. When students can do work of that kind they are ready for post-graduate courses, or for salaried positions in chemical laboratories.

To produce the best results, the preliminary training in fundamental principles must be followed by sufficient practice to fully illustrate their application; by which means the widest knowledge can be obtained in the shortest possible time. It is a fact that a good mechanic in any one line may become a good mechanic in any other line in less time than can an untrained person of equal mental capacity and mechanical ability. The student well trained in carpentry and wood-carving can acquire a proficient knowledge of wood-turning in a few weeks, which is indispensable in learning pattern-making and molding. Sheet metal work, forging and the making and tempering of tools are more easily and better learned if one has had experience in the use of tools requiring special forms and temper. All of the preceding instruction is an excellent preparation for machine-shop practice; but the highest success is unattainable if the entire instruction has not been supplemented by thorough training in drawing, both free-hand and mechanical.

First-class instruction can only be given by first-class teachers, those who have had practical as well as the theoretical training. A teacher of forging, for example, who had had no more training than that of a school shop, could hardly be expected to be a successful teacher of the art. Carry this lack of training on for three or four removes, and such teaching would become a farce. A graduate of Cornell, with no other training than that of the university shop, made his reputation and secured the superintendency of a Montana mine because he was able to weld a broken line shaft, and thus save a shut-down of weeks. I could give scores of such illustrations.

Musicians of the quality of Ole Bull, Paginini, Remenyi or Ovide Musin could give the fiddler or the down-south colored banjo-player such an illustration of time and tune—skill—that they would never forget it; neither would the people who danced.

The greatest value of the Russian system of manual training lies in its power to develop latent capacity. It is in no sense a trade training, but is fundamental to all the mechanical arts. If the student has special ability in any line, it will be pointed out to him with unerring certainty. He will *know* what he wants to do most of all, and will be able to choose wisely in entering a special school to prepare himself for a life-work.

GEORGE R. CAROTHERS.
Lowell Manual Training School.

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Increasing the Capacity of Weighing Scales.

Editor American Machinist:

Referring to query No. 162, in your question and answer column of November 4th, your correspondent proposes to

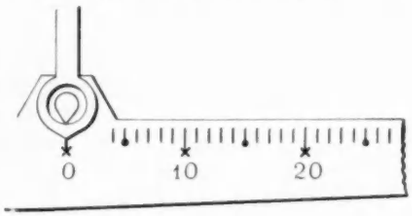

Fig. 1.

increase the capacity of his scale by doubling the weight of his poise. Now this doubles the capacity of the beam only, and as the beam indicates but a small portion of the capacity of the scale (the balance being made up by loose weights, which he will not change), it would seem that the scale would not be overloaded, hence the inaccuracy must be looked for elsewhere. Now in a cotton beam the o mark is located exactly at the pivot edge, as in Fig. 1, and the beam balances empty, that is, without the poise, while in a platform scale beam the o mark may be wherever convenient, but the scale must be balanced with the poise on the beam, and set at o, as in Fig. 2. If J. G. W. will

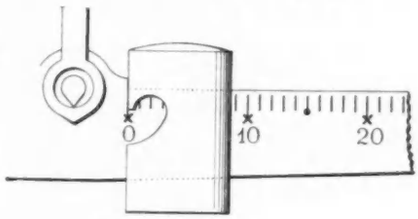

Fig. 2.

make a poise exactly twice as heavy as at present, set it at o, and add sufficient weight to the back end of the beam or to the platform to balance the scale, he will probably be able to weigh as he would with a cotton beam. The markings on the beam would need to be changed; for 10 read 20, for 20 read 40, etc.

W. H. SARGENT.

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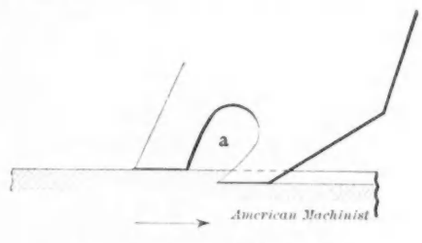
Taps and Dies.

Editor American Machinist:

There appears to me to be so much difference between the conditions under which taps do their work, and that of dies, that they ought not to be compared, as Tecumseh Swift and others have recently done in these columns, in regard to the quantity of stock they will cut. To illus-



A PLANER TOOL LIKE A TAP.

trate: We should have no difficulty in cutting 3 or 4 feet of thread on a piece of ¾-inch round iron, but we ought not to expect to tap a ¾-inch nut 3 or 4 feet deep with the same ease and in the same time that we cut the thread on the iron with the dies, although the amount of stock to be cut would be the same in either case. While the cutting teeth of a tap may be the peer of anything that is made to cut like material with, they are handicapped by not having ready means of getting rid of the chips they cut. They also lack an abundance of rigid material to twist them through a deep nut. On the other hand, milling cutters and bolt dies

might be run till the chips were piled up so the machine would have to be moved in order to give the operator standing room, without seriously interfering with the work that the dies or cutters would do.

An idea of the condition under which taps have to do their work may be had from the enclosed sketch, which represents a shaper planer tool with a flute *a* in front of the cutting edge through which the chips have to pass out at right angles to the direction the work travels. Now, with that kind of a tool, it will be necessary to take very light cuts, so the chips will break up readily so they can get out of the flute. With a very heavy cut, such as is represented in the sketch, it will be seen that it is not the heavy cut, but clearing the tool of the chips will be the difficult part of the operation, and renders light cuts with taps a necessity.

J. H. DUNBAR.

Youngstown, O.

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Casting Large Gear Segments.

Editor American Machinist:

There were some segments for a large spur gear to be made. The gear was some 48 feet in diameter, the face of the gear was 14 inches or 15 inches deep, with a very coarse pitch. It was particularly essential that these segments should be true to pattern, without warp, lumps on teeth, or strains of any kind. It will be seen (Fig. 1) that inside there were some tender projections of sand at *A A*, that would need support when the pattern was drawn, and this is usually, and was in this instance, done by nails. These tender bands or ribs of sand went around the plate of the segment, as per dotted lines. To have rammed this pattern up in a wooden flask and turned it over in the nowel would have been the common way of molding them; but, being molded in green sand, there was a possibility of wrenching and twisting the mold more or less, in rolling it over, so that when the segment was set up it would not run true, or sufficiently so.

It was thought best to bed them in the floor, as then there would not be any disturbance of the pattern to make the teeth uneven in thickness, or the casting twisted. To bed in this pattern, as it is called, and secure the frail round projections as shown at *A A*, and have them tucked true and even, and prevent lumps and scabbing, was another essential. This is a difficult thing to do in most cases, but in this case it was doubly so, as the sand rib next the gear side was some 2 inches deep, with 1 inch at top, 1½ inches at bottom. To tuck this up on the under side of the plate, take it out, nail the sand, and vent it, would split and break the projections *A A* very much; besides, it was a question if it could be replaced sufficiently firm to prevent scabbing, or washing, with great liability of the sand lodging in the teeth, to the injury of, if not the destruction of, the casting.

A scheme was finally invented to put a board *B B B* around this ticklish and vital territory, of this pattern, as shown in Fig. 2. A plain 1-inch board, the necessary width to come even with the bottom of teeth when pattern was turned up ready to ram inside, was sawn half through every 3 inches, or frequent enough to yield to the radius of plate, or segment, and fastened thereto with screws. Ends were screwed on; the pattern was then put on wooden horses, and facing, nails and sand were put in place, and rammed uniformly, securely and comfortably. When rammed and struck off, it was vented thoroughly.

The hole in the floor was prepared by putting in a cinder bed with pipe to lead off the gas. Two iron straight-edges were leveled up 3 inches above the cinders, and sufficiently wide to leave a margin of 2 or 3 inches more than width of pattern. A sand bed was made, above the cinders,

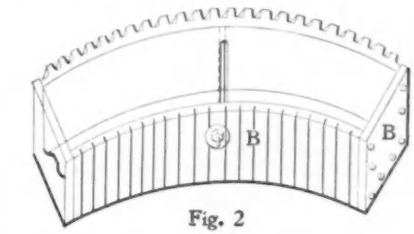

Fig. 2

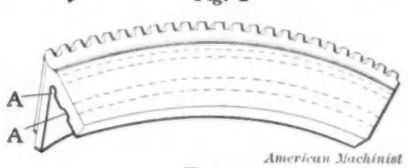

Fig. 1

CASTING LARGE GEAR SEGMENTS.

good and firm, struck off down to the parallel straight edges, and vented with a large wire to the cinders. Then the pattern was turned over on to this bed; the rim under the teeth and also their full length was tucked up firm and even with facing. The boards *B B B* were removed, and the hole rammed up as ordinarily done, also the cope. Now, when the pattern was drawn, the shop-mates had their eyes gladdened by as nice and even a mold as it would have been if rammed in a nowel, with the certainty that it was as true as the pattern; that is, if there was anything wrong, as to straining, the fault could be laid right, and directly, to the molder; it could not be laid on to the yielding of bottom boards or nowel.

Many things can be molded much surer, truer and smoother by this method, especially if the surface is uneven, than by tucking up and removing pattern, and nailing delicate points, and placing pattern on mold again, as the guides are improvised, as a rule, and pattern seldom goes straight to place the second time. The whole of this lot of segments were made without a skip, and while they weighed some 1,000 or 1,200 pounds apiece, the variation in weight, I think, was about 5 pounds, one with another. They were as uniform in appearance in every way as so many peas.

L. C. JEWETT.

Boston.

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"To Be Done to Your Satisfaction."

A case of some interest to machinery builders was decided by the courts of New York recently. A builder of a ventilating fan had contracted to install such a fan, and in the contract appeared the following clause: "We guarantee to ventilate the receiving room to your satisfaction, otherwise we will remove wheel, and also material, without cost to you." Upon the installation of the fan, the purchaser claimed that he was not satisfied, and therefore refused to pay. He was sued for payment, and the court held that the work in question was not of the class which must be done to suit the taste or fancy or caprice of the recipient, and which may be rejected arbitrarily and without reason given (such as making a suit of clothes or molding a bust), but rather of the class to which the rule applies that, "that which the law will say a contracting party ought in reason to be satisfied with, that the law will say he is satisfied with."

It thus appears that one cannot avoid paying for a machine the good or bad performance of which can be accurately and definitely determined, simply upon the basis of a mere whim, but must be prepared to prove the existence of imperfections in the machine; or, in other words, that he has some reasonable ground for being dissatisfied with its performance. This seems to be in accordance with common-sense.

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The remarkable property which some alloys of nickel and iron possess of having a coefficient of expansion nearly equal to zero, suggested the desirability of employing these alloys for the construction of measuring instruments. With this object in view, M. Guillaume, in "Comptes Rendus," has determined the densities and moduli of elasticity of a series of alloys of iron with 4 to 45 per cent. of nickel. One curious result in the case of alloys with 25 per cent. of nickel is, that a rule made of this alloy and annealed at a given temperature continues to elongate when it is kept at a lower temperature. He also finds that an alloy containing 22 per cent. of nickel expands when it is heated considerably more than ordinary steel, but an alloy of iron with 37 per cent. of nickel hardly expands at all, so that the presence of an additional 15 per cent. of nickel in nickel-iron alloys is sufficient to entirely change the nature of the metal.—"Engineer."

AMERICAN MACHINIST

Published Thursdays by

American Machinist Publishing Co.,

256 Broadway, New York.

John A. Hill, President and Treasurer.

C. A. Hansmann, Sec'y.

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Space in advertising pages only is for sale.
We invite correspondence on subjects pertaining to machinery.
Name and address must always be given, though not necessarily published.
Communications for or relating to the reading columns should be addressed to the Editor. All business communications should be addressed to the Company.
Subscribers can have their mailing address changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once. Date on wrapper denotes week with which subscription expires.

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SUBSCRIPTION PRICE:

$3.00 a year in advance, postage prepaid in the United States, Canada and Mexico.

$4.00 a year to other countries, postage prepaid.

Entered at Post Office, New York, as second-class mail matter.

For Sale by Newsdealers, Everywhere.
No back numbers beyond 1896.

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Machinists' Advertising.

Near the conclusion of Prof. Sweet's last letter of foreign travels, published elsewhere in this issue, he touches upon the subject of advertising in connection with an engineering business. As his remarks on this subject so far as they may have any influence, might be considered to be prejudicial to the interests of the "American Machinist" they might have been excised by a stroke of the blue pencil, and this probably is the fate they would have met in most editorial offices. But such action would have given Prof. Sweet ground for believing that we were afraid to call attention to the fact that machinery can be built and sold without the aid of advertising, as that term is commonly understood. Instead, however, of being afraid to have the facts about advertising known, the publishers of this paper are glad to have them known, and feel very confident that if they were more generally and more thoroughly known and understood, it would be a good thing for publishers of honestly conducted technical journals.

Though we aim to rather closely confine ourselves to strictly technical subjects yet the subject of advertising, having been thus introduced, and being one in which every machine builder is interested more or less, whether he wishes to be or not, we see no harm in devoting a little space to it, just for once.

We might reply to Prof. Sweet's remarks by saying simply that for one firm that makes any great success without advertising there are a hundred that have been successful with advertising and who continue to advertise and believe in it. While this would perhaps be a sufficient answer, it would be in a certain sense incomplete.

The fact is that every establishment which does more than a local business, must be advertised in some way. That is to say, it must extend its acquaintance and constantly find new people who can be informed of its existence and of its business. Even Prof. Sweet would probably admit that a department store in New York would scarcely succeed without liberal advertising. Its business is purely commercial, while the business of making engines or machine tools has two sides—it is professional and it is commercial.

After a machine is built (and sometimes before), it must be sold. The building of it is mechanical or professional work, but the selling of it at a profit and collecting the money is purely business, and to be most efficiently done, must be conducted upon business principles.

It might be very gratifying to the pride of some of us, and more to our taste also, if there were no commercial side to the machine business—if it were all simply high-class engineering; but engineers must eat bread, and most of them prefer butter on their bread, and find that, in practice, they must keep up a more or less active hunt for dollars with which to buy this buttered bread. The hunt being conceded to be necessary, the next question naturally is as to the best weapons.

The fact is, that although Professor Sweet pays no advertising bills, as such, he is yet one of the best advertised men in the machine business, and as a result of some study of, and considerable acquaintance with his methods, we feel warranted in giving it as our opinion that the time he devotes to things which, in the end, resolve themselves into advertising, whether he intends them to be so or not, would, if paid for at a fair price in consideration of his value as an engineer, prove to be by far the most expensive advertising that could be purchased.

The writer has in his possession printed matter from the Muir establishment, which, though not bound into a catalog, is equivalent to it, and Professor Sweet issues a catalog which is a very good and efficient one. Both these establishments are thus, and otherwise, advertised. The problem for proprietors of other establishments is, whether it would be possible for them to advertise in the same way or not, and, granting that it would be possible, whether it would not be much cheaper, or at least whether larger and better results would not be obtained by the same expenditure of time and money in the way that so many other successful men have found to be most advantageous.

Every builder of machinery has certain things he would like to say to every possible purchaser of his machinery. He may employ traveling men to go to them and say these things; he may write letters to all of them; he may sit in his office and wait for them to come in and be talked to, or he may put what he desires to say into the advertising columns of the paper or papers most likely to reach his possible customers. We do not see that the question of professional ethics enters into the matter at all, in deciding which of these courses is best to follow. It is purely a matter of business, and should be decided upon business principles. No one in possession of his senses would claim that the business of machine construction and selling cannot possibly be carried on without advertising, for there is proof to the contrary; and in fact there are many machine-building establishments, especially in Great Britain, whose success was well established before the era of technical journals. It is not a question of what is possible, but of what is the best course to pursue under the conditions of to-day.

Emerson's remark that "If a man can write a better book, preach a better sermon, or make a better mouse-trap than his neighbor, though he build his house in the woods, the world will make a beaten path to his door," conveys an important lesson on the value of thoroughness; but, under the commercial conditions existing now, the best mouse-trap maker would have to take some means of letting people know he was in the business, and that his trap really possessed virtues peculiar to itself, or a maker of inferior traps would be likely to drive him out of the business. Besides, the beating of paths is usually a slow operation, and the machine manufacturer of to-day needs sidetracks to his door.

Finally, we may say that the interest in the question for those who read such journals as ours, is in the fact that if all machinery builders took the same view of the matter that is taken by Professor Sweet, there would probably be no technical journals worth speaking of; or if there were, they would necessarily cost readers about ten times as much as they now do.

Since writing the above, we happen to notice the advertisement of Wm. Muir & Co. of Manchester, on the first page of an English engineering journal.

Inquiries for Machinery.

Those who make, or who may know of the makers of such machinery as is called for below, will oblige us by sending name and address, mentioning the number of the inquiry. We cannot forward catalogs. We have inquiries as follows:

5. Printing presses for printing silver or gold letters upon silk badges, hat linings, etc.

6. Machine for cutting linen for shirt makers, to be worked by power and by hand.

7. Machinery to plait such fabrics as are worn by ladies.

8. Machine to make button holes in shirt collars and cuffs.

9. For pipe-bending machine capable of bending pipes or tubes from 3 to 8 inches diameter.

10. A correspondent wants repairs for the Hotchkiss cushion hammer, and wishes to know where he can obtain them.

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Personal.

Passed Assistant Engineer B. C. Bryan, U. S. N., has been detached from the Dolphin and ordered to the New York Navy Yard, temporarily.

Chief Engineer W. W. Dungan, U. S. N., will be detached from Cramps' Yards, December 21st, ordered home, and to be retired December 22d.

Mr. Wm. H. Harrison, formerly with the Bullard Machine Tool Company and the Niles Tool Works, is now with J. J. McCabe, 14 Dey street, New York.

Mr. W. H. Ermentrout, of Reading, Pa., has retired from the firm of Ermentrout & Boyer, and expects soon to go into business for himself as a machinist.

Assistant Engineer S. E. Moses, U. S. N., will be detached from the Monterey, December 4th, ordered home, granted two months' leave, authorizing delay of arrival home till January 15th.

We will consider it as a favor if our readers will send in items of news regarding changes of foremen, superintendents or others prominently connected with the machine business. Such items are legitimate news of the trade, and we are glad to make room for them.

Mr. H. E. Greenwood, who was for several years superintendent of the Hancock Inspirator Company, and for the past four and a half years mechanical superintendent of the Haines, Jones & Cadbury establishment, at Philadelphia, has accepted a position as superintendent of the detail department of the Westinghouse Electric & Manufacturing Company, at East Pittsburg, Pa.

Mr. C. L. Libby, who was for over seven years superintendent of the shops of the Bullard Machine Tool Company, at Bridgeport, Conn., and has been more recently connected with the Pacific Iron Works of the same city, has accepted a positon as machine tool designer with Ludwig, Loewe & Co., of Berlin, Germany, and will probably sail for Germany about the first of the coming year.

Mr. H. B. Bartlett, a well-known toolmaker, who was at one time connected with the Thomas Clock Works, was afterward in charge of a department with the Mergenthaler Linotype Company, and has recently been assistant superintendent of the small-tool department of the Pratt & Whitney Company, has accepted a position as superintendent of the small-tool department of Ludwig, Loewe & Co., of Berlin, Germany, and expects to sail for that place about the first of the coming year.

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Obituary.

Aretas Blood, who established and conducted the Manchester Locomotive Works, of Manchester, N. H., died at that place November 24th. He was also interested in a number of other manufacturing concerns, among them the Amoskeag Company and a number of cotton manufacturing concerns.

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On November 22d, a boiler exploded at the works of the Graves Elevator Company, Rochester, N. Y., and killed two men, one of whom was an inspector for the Hartford Steam Boiler Inspection & Insurance Company, who had entered the boiler room for the purpose of making an inspection.

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It is announced that the Rhode Island Locomotive Works will be sold by public auction December 23d, to satisfy a mortgage of $300,000 held by the Rhode Island Hospital Trust Company as trustee, to secure bonds to that amount issued by the Locomotive Company in 1894.

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The twenty-eighth annual meeting of the American Institute of Mining Engineers will be held at Atlantic City, N. J., beginning February 15, 1898.

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Commercial Review.

New York, Saturday Evening, Nov. 27

MACHINE TOOLS.

Business moves on in about the same manner as formerly, with some grounds for encouragement; that is, some of the authorities report good inquiries and a firm tone. The market, of course, exhibits fluctuations. The end of the year is not far off, and, as usual, this is being made an excuse for delay.

"The demand for tools seems to be spreading out," remarks one seller; "or, in other words, it is coming from a greater variety of lines. Of course, everyone knows that the electrical people are good customers, and indeed the same is true, to some extent, of the engine builders."

A certain large local tool agency, upon the day previous to Thanksgiving, received one of the most satisfactory batches of orders of any day for six months past. These did not consist of a large contract or so, which might happen to come in, but were chiefly for one or two tools each, which makes it all the better sign.

A certain metal press company is running night and day and Sundays. They are so busy that last week they turned away orders for four presses. They have just built four coining presses, of 12,000 pounds weight each, for one of the states of Central Asia.

A local machinery seller remarks, with some disapproval, that American manufacturers protect the interests of their European agents to the extent of refusing to furnish to those in New York tools known to be destined for the Continent. He thinks that this is carrying matters too far and will, in the end, be detrimental to the interests of the manufacturers. Questions of this nature have given rise to a good deal of wrangling in the past. It is necessary to draw the line somewhere, but it is hard to decide upon a position which will suit all parties.

THE FOREIGN FIELD.

Nobody seems to complain much about exports. Whether they are quite up to last year's high-water mark or not, there is a good volume of them. The English engineers' strike does not appear to excite very much despair among local houses. The head of one remarks having shipped three consignments of tools to England this week, and he is not alone in considering the English trade good. This, of course, does not mean that injury has not resulted in some quarters from the strike, and some of our tool builders seem to have felt it materially. The negotiations now in progress between the engineers and their employers show that considerable determination exists upon the part of the latter, at least. A letter received by an American concern, locally represented, from a prominent English shipbuilder states that he intends to hold his ground.

One transaction in the machinery market is of interest as indicating the expected termination of the Cuban war and the revival of industry upon that island. A local company reports having made a sale of iron-working tools, etc., to be shipped there, and that it is expecting to receive a larger order. The purpose to which it is believed that the tools will be put, is the repair of sugar plantation machinery, etc. Business men are considered good prophets of matters of national importance, and during the stormy days of the Turkish question the stock market was regarded as the most reliable barometer by which to judge of changes in the political atmosphere. Perhaps the matter above alluded to has such a sig-

nificance. One must not suppose that no Cuban trade has been carried on of late, however. Among the export statistics this week were mentioned as going to Cuba, $14,220 worth of steel rails.

The company which has made the Cuban sale above alluded to reports that trade with South America is good, particularly with Venezuela.

MACHINERY EXPORT STATISTICS.

The Monthly Summary of Finance and Commerce for September, prepared by the Bureau of Statistics, United States Treasury Department, shows the following:

Exports of metal-working machinery during September amounted to $308,838; for July, August and September, $890,724. Electrical machinery for the month, $129,567; for the three months, $373,119. Pumps and pumping machinery, $152,117; for the three months, $503,036. Shoe machinery, $57,433; for the three months, $164,319.

Other lines of machinery which, having been separately classified for a longer time, permit of a more extended comparison, include: Locomotive engines, $88,364, for September, this year; $145,698 for September, last year; $2,319,428 for the first nine months this year; and $2,581,763 for the first nine months of last year. The figures upon stationary engines for the corresponding periods are: $34,229, $14,648, $286,622, $159,714. Upon boilers and parts of engines they are: $39,220, $70,198, $453,952, $490,075.

THE WOOD-WORKING MACHINERY TRUST A REALITY.

We stated last week that there were conflicting reports as to the developments

(*Continued on page 35.*)

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Business Specials.

Gear wheels, gear cutting. Grant; see page 16.

Forming Lathes. Mer. Mach. Tool Co., Meriden, Ct.

Brass ptrn. letters and figs., for sweatg. on metal trns. Knight & Son, Seneca Falls, N. Y., Box 12.

Selden Packing for stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., N. Y.

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Wants.

Situations and Help Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. The Cash and Copy should be sent to reach us not later than Saturday Morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Situations Wanted.

Mech'l draftsman (25), graduate, 1 year exp., wants position anywhere. Box 101, AMER. MACH.

Mech'l engineer, with extensive exp. as foreman and manager of large mch. works; capable of handling men, is open to engmt. Box 103, AM. MACH.

By practical machinist and draftsman, position as foreman or supt. of machine shop; exp. on engines, pumps, air compressors, etc. Box 92, AMER. MACH.

First-class automatic screw machine foreman wants to change position; will work for small salary and a percentage of saving in cost of production. Address Box 98, AMERICAN MACHINIST.

Situation wanted by foreman desiring a change; man of extensive experience on steam, gas engine tool building, designing and general repairing; best of reference. Box 102, AMERICAN MACHINIST.

Mechanical engineer, with extensive experience as superintendent and manager of large machine works, is open to engagement. Stationary and marine engines, boilers, foundry work, gearing and general machinery. Can manage shops, engineering department, estimate or solicit. Best of references. Address Box 82, AMERICAN MACHINIST.

Die maker—Position wanted by an A1 die and tool maker, well up in all latest and improved dies and tools for novelty and general hardware, dies for blanking, drawing, stamping, forging, etc., for all sheet metal as brass, iron, steel and aluminum; well up in modern shop methods to increase production; also automatic dies, feeds, stops, etc.; can design and develop ideas; 10 years experience in best shops in New England; age 30; can accept Jan. 1, 1898; best references to ability and character. Address Box 99, AMERICAN MACHINIST.

Help Wanted.

Wanted—Foreman for foundry employing from 40 to 60 men; must be capable of making his own mixture and handling men to the best of advantage. Address Box 93, AMERICAN MACHINIST.

Wanted—A mechanical draftsman, one familiar with designing rolling mill machinery preferred; must be quick and accurate. State age, experience and salary wanted. Address box 852, Reading, Pa.

We want steady, industrious and ambitious foreman for our new mch shop. Work mostly repairs. Must be capable of soliciting work and making estimates. Dickson Car Wheel Co., Houston, Texas.

Wanted—A thorough-going practical man to solicit work for an old established foundry; one who controls some trade preferred; it is a good opening for the right man. Box 100, AMER. MACH.

Wanted—Foreman blacksmith in large mch. shop; one that has had experience with trip hammers and general blacksmithing; state age and experience. Address reply to Box 104, AMER. MACHINIST.

Wanted—For a machine tool works in England, several first-class machinists used to assembling plain and automatic screw machines, etc., of the best class. A splendid opening for really first-class men at good pay and permanent jobs if suitable. No dispute of any kind. Reply giving full particulars of exp., age, salary. Box 105, AM. MACH

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Miscellaneous Wants.

Advertisements will be inserted under this head at 30 cents per line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Cheap 2d h'd lathes & planers. S. M. York, Clev'd, O.

Calipers & Gauges. F. A. Welles, Milwaukee, Wis.

Dies & Die Mak'g, $1. J. L. Lucas, Providence, R. I

The Dutton Wet Twist Drill-Grinder is sold by the Garvin Machine Co., New York City.

Best and cheapest Bolt Header, made by Bansh & Harris Machine Tool Co., Springfield, Mass.

Machinery to order, inventions developed. Leland, 469 Van Buren Street, Brooklyn, N. Y.

Light and fine mach'y to order; models and electrical work specialty. E. O. Chase, Newark, N. J.

For Sale—Second-hand drill presses, engine lathes & planers. Dietz, Schumacher & Boye, Cincinnati, O.

We make a specialty of Shartle's patent safety set collars. Prices low and samples free. Middle town Machine Co., Middletown, Ohio.

Wanted—To manufr. for respons. parties sheet metal stampgs., ptns., models, dies for metal, leather, cloth or paper. Bell Elec. Co., 46 E. 14th St., New York.

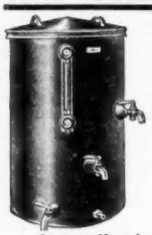
Model Locomotives—Complete castings, latest N. Y. Cen. standard, up to date; 4c. in stamps for cat. alog. G. H. Olney, 163 Herkimer St., Brooklyn, N. Y.

Lathes, planers, drills, milling machines, vises, also brass working machinery second-hand; must be modern and in first-class condition. C. C. Wormer Machinery Co., Detroit, Mich.

Small Manufacturers Wanted—The business men's association of one of best cities in middle West solicits correspondence with parties seeking new location for mfg. enterprises. "Business," AM. MACH.

For Sale—One engine lathe, 20" swing by 8' bed, G. A. Gray make, $170; 1 lathe, 14" swing by 6' bed, Lodge & Davis make, $100; 1 horizontal boring mill, bores from 4" to 20" cylinder, Barrett Vise & Tool Co. makers; 1 extra heavy vertical boring mill, has 3 separate cutter bars, each has independent automatic feed, weight 15,000 pounds, price $600. Box 91, AMERICAN MACHINIST.

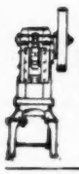
THE CROSS OIL FILTER



actually reduces oil bills 50% or more. Sent on approval. Used in 14 countries. Testimonials from leading firms in every field of industry.

Business established seven years

THE BURT MFG. CO.
AKRON, O., U. S. A.
Largest Manufacturers of Oil Filters in the World.



Drop Hammers, Presses, Special Mach'y Dies,
THE STILES & FLADD PRESS CO.,
WATERTOWN, N. Y.

JUST PUBLISHED.
GAS, GASOLINE AND OIL ENGINES
By GARDINER D. HISCOX, M. E.

The only American book on an interesting subject. 279 large pages, 8vo, illustrated with 206 handsome engravings. **$2.50** prepaid to any address.

Full of general information about the new and popular motive power, its economy and ease of management. Also chapters on Horseless Vehicles, Electric Lighting, Marine Propulsion, etc.

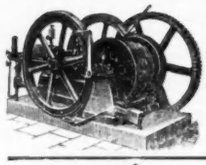
SPECIAL CHAPTERS ON

Theory of the Gas and Gasoline Engine, Utilization of Heat and Efficiency of Gas Engines, Retarded Combustion and Wall Cooling, Causes of Loss and Inefficiency in Explosive Motors, Economy of the Gas Engine for Electric Lighting, The Material of Power in Explosive Engines, Carburetters, Cylinder Capacity, Mufflers, Governors, Igniters and Exploders, Cylinder Lubricators. The Measurement of Power, The Indicator and its work, Heat Efficiencies, U. S. Patents on Gas, Gasoline and Oil Engines and their adjuncts.

☞ Our large general Catalogue of books, on every practical subject, mailed free to any address.

NORMAN W. HENLEY & CO.,
15 Beekman Street, New York.

Weber Gasoline "Hoist."



Built in sizes from 6 to 50 H.P., both single and double drum, operated on gasoline, gas or distillate. Especially adapted for *mining, quarry* and *ship* use. Guaranteed big money savers. State size wanted, purpose wanted.

Weber Gas Engine Co.
452 *S. W. Boulevard,*
KANSAS CITY, MO.

HUGH HILL TOOL CO.,
Anderson, Ind.
See last week's issue.

THE BURR PATENT . . . .
Steel Safety Lift Block.

Light and portable, cheap and durable.

A self-locking rope tackle block that will lock without fail, hanging straight, upside down, lying flat, or at any angle.

Runs as freely as an ordinary rope tackle block. Holds more securely than a chain block. Locks instantly and does not cut the rope. Allows the load to be lowered safely and slowly, the operator using only one hand. Can not stick nor jam when the load is to be lowered

For Electric Work it is the most convenient, most positive wire stretcher on the market. . . . .

Adopted by the Penna. R. R. Co.

Send for descriptive circulars and prices.

THE BURR MFG. CO.,
823 Society for Savings Bldg.
Cleveland, O., U. S. A.

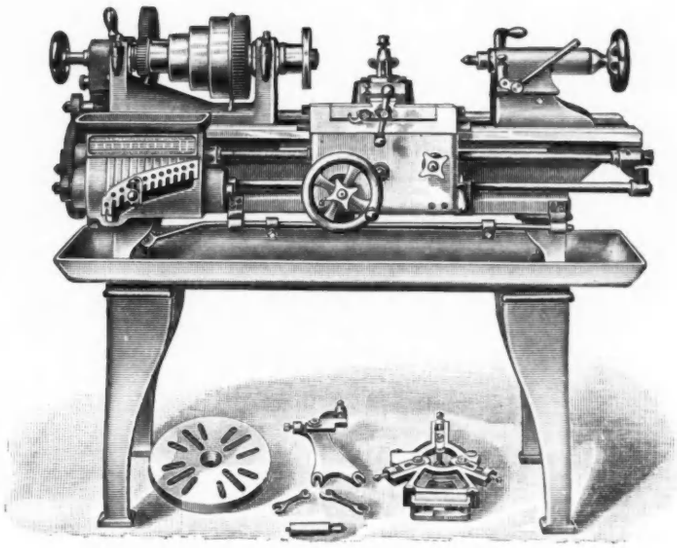
A Milling Machine

X That saves making half the cutters, and half the fixtures, must save money.

X The "Duplex" does just that. The cutter arbor can instantly be set vertical, horizontal or any angle between.

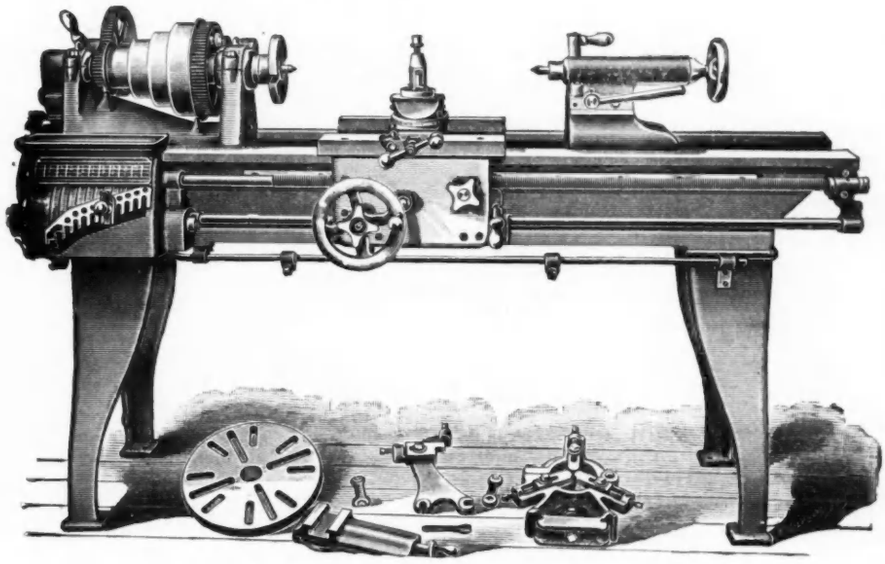
WALTHAM WATCH TOOL CO.
Springfield, Mass.

WALTER H. FOSTER, AGT.,
125 Liberty Street, - - New York.



12" Hendey-Norton Lathe

is fitted with drawing-in sleeve and American Watch Tool Co's standard chuck, used in making small taps, reamers, etc. Work finished first and cut from bar afterwards. No centering required. See carriage reverse lever by right-hand side of apron; no reaching for countershaft shipper required.



14" x 6' Hendey-Norton Lathe.

These lathes are modern, high-grade, practical tools, and are specially adapted for tool-room work. They have the Norton Attachment for screw cutting, giving 36 different threads and 36 different feeds with only two changes of gear and movement of lever in gear-box from one notch to the other. Note the automatic stop under apron. It will automatically stop carriage at any desired point in either direction; invaluable for internal or duplicate work. SEND FOR CATALOGUE.

The Hendey Machine Company,

Torrington, Conn.

Agents for the Pacific Coast, Pacific Tool & Supply Co., San Francisco, Cal.

European Agents, { Schuchardt & Schütte, Berlin, Vienna, Brussels, Stockholm. Chas. Churchill & Co, Ltd., London and Birmingham, Eng. Adphe. Janssens, Paris, France. Eugen Soller Basel, Switzerland.

(Continued from page 34.)

of the wood-working machinery manufacturers' combination, and alluded to one to the effect that it was soon to go into operation. This proves to have been well founded. A meeting was held in Williamsport, Pa., on November 20th, and "The American Wood-Working Machinery Company" was organized, which, it is stated, will control fourteen or fifteen concerns. The capitalization of the company is $8,500,000. The membership comprises Rowley & Hermance Company, Williamsport Machine Company, Lehman Machine Company and Young Bros. Machine Company, all of Williamsport; Levi Houston Company, Montgomery, Pa.; Goodell & Walters, Philadelphia; Glen Cove Machine Company, Brooklyn; Hoyt Bros., Aurora, Ill.; Globe Machine Company, Chicago; E. B. Hayes Machine Company, Oshkosh, Wis.; Frank H. Clement Company, Rochester, N. Y.; C. B. Rogers & Co., Norwich, Conn., and a concern located at Green Bay, Wis. It has been earnestly desired that the J. A. Fay & Egan Company, of Cincinnati, shall be included, and there is conflict of statement as to whether they have yet fully enlisted. It is reported that the S. A. Woods Machine Company, Boston, has been absorbed since the meeting.

PITTSBURG REPORT FOR NOVEMBER.

The situation in trade circles has not materially changed since the last report from your correspondent. Advices from different points tend to show that general inactivity and quietness are the main features. There seems to be the same hesitation on the part of buyers and the same lagging of business. Under these circumstances, weaker prices are not surprising. It is generally admitted that the balance of the year is likely to be dull, until the current of business sets in after January 1st.

In the raw-iron market, comparatively few large sales are being made, and in spite of the large production, stocks seem to be disappearing, as the amount of iron on hand was cut down considerably during last month. Every furnace in the Pittsburg district is in active operation and producing largely.

In heavy machinery for rolling-mill purposes there are some orders being placed. The Robinson-Rea Manufacturing Company, of Pittsburg, has just placed in successful operation the new bar mill built for the American Tin Plate Company, at Elwood, Ind. The plant will have a capacity of 400 tons of steel bars daily. A bar 75 feet long can easily be made in 50 seconds. The machinery is automatic, and is operated by hydraulic pressure. The Westinghouse Electric & Manufacturing Company has just completed the largest electrical transformer in the world for commercial use. It will have a potentiality of 100,000 volts, and its successful construction is remarkable from the fact

that electricity at such a pressure in a near approach to lightning.

The Cahall Sales Department, of Pittsburg, received 13,000 horse-power boilers in orders on November 19th, of which 7,000 were for the Cahall vertical type, and 6,000 for the Cahall Babcock and Wilcox type. This they clam to be the largest single day's business that has ever been done by any boiler manufacturing concern since water-tube boilers were first invented.

CINCINNATI NOTE.

In the manufacture of machine tools, some of the Cincinnati concerns are still very busy. The Bickford Drill & Tool Company have an order for the largest drill they make, from Yokohama, Japan, and claim it to be the first American radial drill going to that country. They have large orders from Russia, France and Germany. Their home trade has been very good and improving. They are running full force of men, and adding new tools to their plant.

Quotations.

NEW YORK, Monday, November 29.

Iron—American pig, tidewater delivery:

No. 1 foundry, Northern	$11 75 @ $12 00
No. 2 foundry, Northern	11 25 @ 11 50
No. 2 plain, Northern	10 75 @ 11 00
Gray forge, Northern	10 25 @ 10 50
No. 1 foundry, Southern	11 00 @ 11 25
No. 2 foundry, Southern	10 50 @ 10 75
No. 3 foundry, Southern	10 25 @ 10 50
No. 1 soft, Southern	11 00 @ 11 25
No. 2 soft, Southern	10 75 @ 11 00
Foundry forge, Southern	10 00 @ 10 25

Bar Iron—Base—Mill price, in carloads, on dock: Common, 1.05 @ 1.10c.; refined, 1.15 @ 1.20c. Store prices: Common, 1.25 @ 1.35c.; refined, 1.30 @ 1.50.

Tool Steel—Ordinary sizes, standard quality, 6 @ 7c., with some grades perhaps a little less; extra grades, 11 @ 12c.; special grades, 16c. and upward.

Machinery Steel—Ordinary brands, from store, in small lots, 1.50 @ 1.60c.

Cold Rolled Steel Shafting—Base sizes, from store, in small lots, 2.40 @ 2.50c.

Copper—Carload lots, Lake Superior ingot, 10¾ @ 10¾c.; electrolytic, 10⅝ @ 10¾c.; casting copper, 10½ @ 10⅝c. for ordinary brands.

Pig Lead—Carload lots, 3.75 @ 3.80c., f. o. b., New York.

Pig Tin—For 5 and 10-ton lots, 13.75 @ 13.80c., f. o. b.

Spelter—Carload lots, 4.00 @ 4.10c., New York delivery.

Antimony—From 7 @ 8¼c., according to brand and quantity.

Lard Oil—Prime city, present make, commercial quality, in wholesale lots, 37 @ 38c.

▲ ▲ ▲

Manufactures.

Whitman Cook, of Fryeburg, Me., is to erect a new mill.

The Reading (Mass.) Planing Mill has been destroyed by fire.

At Southport, Conn., C. O. Jelliff & Co. are to erect a weaving factory.

Loomer's Sons' Company is to erect at Bridgeport, Conn., a new factory.

At Niagara Falls, the Acetylene Gas Machine Company will erect a plant.

The S. Flory Manufacturing Company, of Bangor, Me., has been incorporated.

The machine shops of C. M. Whitlock, Wilmington, Del., are undergoing repairs.

The Byers Chemical Works in Uwchlan, Pa., is having an addition built to its factory.

J. H. Mitchell is to erect a foundry at 821 North Thirteenth street, Philadelphia, Pa.

At Oyster Bay, N. Y., John Titus has commenced the erection of a new mill, 30 x 100 feet.

Renshaw's Ratchet Drills, Nos. 1 and 3; ***Upright Drilling Machines,*** single and multi-spindle, both those in which the spindles are without feed movement and tables are operated by hand or foot lever, and those in which the tables have provision for adjustment, and spindles are fed by hand lever, or by hand wheel, or automatically; also, ***Horizontal Drilling Machines,*** single and multi-spindle. Ask for the Machinists' Catalogue.

▲ ▲ ▲

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ARE YOU LOOKING for a lathe? We are building them in various sizes from 9 in. to 15 in. swing, in various lengths, both engine and speed lathes. Our designs are the **latest**, while the **workmanship, material** and **finish** are of the **highest** order. Our catalogue will tell you all about them, as well as of our planers, shapers and other tools.

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A knowledge of Algebra and Geometry is all that is required to use this book. By MANSFIELD MERRIMAN. Illustrated, 12mo, cloth, $1.00.

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"Lightning" and "Green River" Screw Plates, Taps and Reamers of all kinds.
Bolt Cutters, Drilling Machines, Punching Presses, etc. Send for Catalogue.

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★★★
Foot Power Screw Cutting, Automatic Cross Feed, 9 and 11" Swing.
Send for Catalog B.
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'96 THE NEW '96 JENKINS '96

IS the Perfection of Joint Packing. Instantaneous, **Does Not Squeeze Out** and not necessary to follow up joint. We guarantee it to last for years on any and all pressures of steam or any kind of joint where packing is required. Does not rot, burn or blow out, therefore the best for all purposes. Call for and insist on having **'96 JENKINS '96,** stamped like cut. . . . . .

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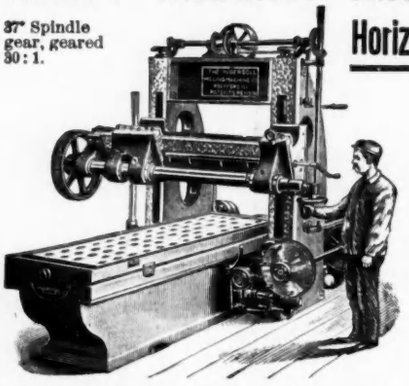
HEAVY MILLING MACHINES EXCLUSIVELY
Horizontal or Vertical Spindles or Both

37" Spindle gear, geared 30:1.



36" x 36" x 8' Mach. Net Shp'ng Wgt. 24,000 lbs.

SIZES:
15", 20", 24", 36", 48", 60", any length.

Wide range of cutter speeds.
Variable table feed from 3-16" to 10" per minute.
Power elevating and lowering device.
Table adjusted by power in either direction.

Write for full information and prices, to

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Foreign Agents: C. W. Burton-Griffiths & Co., London, Eng. / A. Janssens, Paris, France. / DeFries & Co., Berlin and Dusseldorf.

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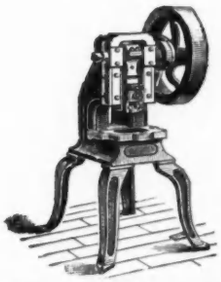
PERKINS POWER PRESSES.



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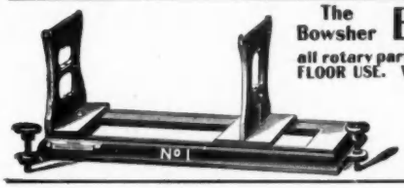

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You get an absolute level in ten seconds.

A TIME SAVER. PAYS FOR ITSELF IN 30 DAYS.

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Saves Time, Labor, Money.

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Elevators

And Special Machinery.

ELECTRIC, BELT-DRIVEN OR HAND-POWER.

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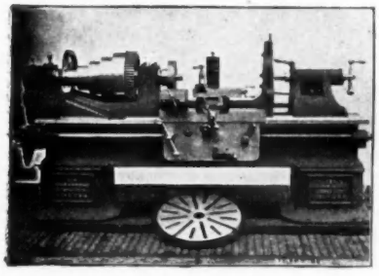
PUSH IT,



Crowd it, that's what it is made for. It will do an enormous day's work. Why? Designed that way Power, stiffness, ease of operation and strictly modern movements. Ten seconds to change from one feed to another; same is true about cutting screws.

Sizes, 14" to 42" swing.
Beds in even lengths.

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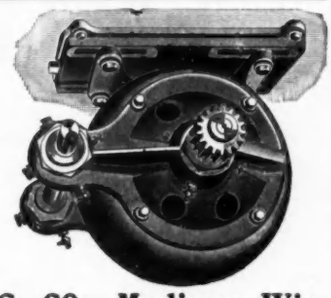
Any Desired Speed Given the Driving Machinery.
Also a Full Line of Multipolar Generators.



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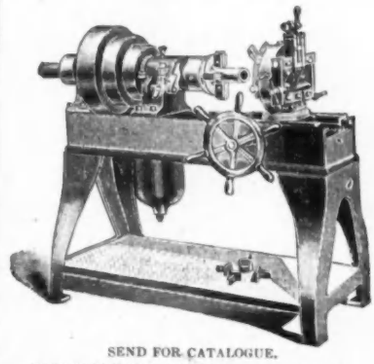

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Vertical Millers,
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Micrometer Calipers are among the best of modern tools as time savers and money makers.

Our Catalogue on application.

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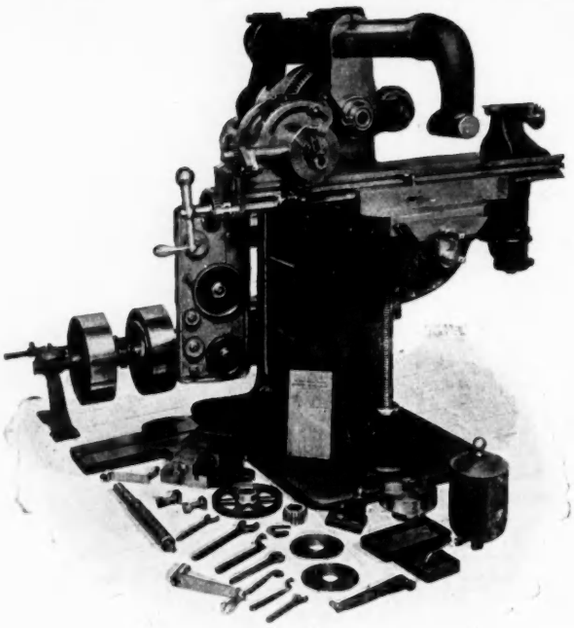

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Universal Milling Machines

Built in 4 Sizes. No. 1, No. 2, No. 3, No. 4.

Recently improved and right up to date.

Also,

Plain, Duplex, Lincoln, Hand and Sprocket Wheel Millers.

6 styles—25 sizes.

Our Catalogue describes them.

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We build Milling Machines possessing all the desirable features of Range, Strength, Convenience and Durability. They are not excelled by any others. Workmanship strictly of the highest grade.

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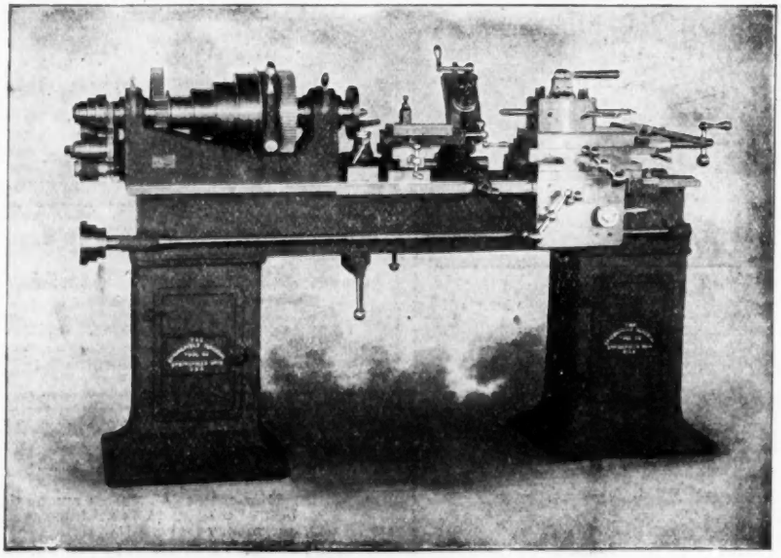

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Brass Workers' Lathe, Very Complete.

Furnished with or without Clutch Head.

Has Taper Attachment.

Left-Hand Threads Cut with Right-Hand Leaders.

The TURRET operated by TWO simple movements of ONE Hand.

Many other Good Things mentioned in Circular about this Machine.

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Builders of Engine and Turret Lathes and Shapers.

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UNIVERSAL MILLING MACHINES.

Brown & Sharpe No. 1, tool size.
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Garvin Machine Co.'s, various sizes.
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Niles' latest, 26 in. x 8 ft., two heads.
Fitchburg, Putnam and Pond, sizes 24 to 48 in. wide.

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Baush, 110 and 160 in. swing.
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Standard, bicycle size.

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32" x 32" x 20', Lodge & Davis.
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60 x 21 Wilmarth, tple. grs.
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70 in. Newark Pulley, 2 tools.
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20-37 x 14 Illingsworth Gap.
20 x 14 Pond, C. R. and P. C. F.
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14 x 9 Dexter, C. R. and P. C. F.
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15 x 6 L. & B. Fox Monitor.
8 x 4 Pryibil spinning.
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DRILLS.

32 in. Pond, S. Grs. and self feed.
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24 in. Harrington Tapping.
4-Spindle Lamson Gang Drill.
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2-Spindle Garvin Gang.
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42 x 42 x 10 ft. Putnam.
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800-lb. Merrill Friction Drop.
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450-lb. Merrill Friction Drop.
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200-lb. Beaudry Power Hammer.
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MISCELLANEOUS.

2-Spindle Ames Profiler.
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18 H. P. Vertical Boiler.
7 in. x 7 in. Baxter Eng. & Boiler.

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SECOND-HAND MACHINERY.

ENGINE LATHES.

1 14 in. x 3 ft. 6 in. Putnam.
1 15 in. x 6 ft. Dustin.
1 15 in. x 6 ft. W. & L.
1 18 in. x 5 ft. Ames.
1 16 in. x 7 ft. D. & H.
1 18 in. x 8 ft. D. & H.
1 24 in. x 13 ft. L. & M., special.
1 21 in. x 9 ft. P. & W., elev. rest and taper att.
1 27 in. x 10 ft. D. & H.
1 28 in. x 12 ft. W. & L.
1 30 in. x 13 ft. Bement.
1 32 in. x 16 ft. Putnam.
48 in. x 18 ft. G. & S.
1 Pit Lathe, 7½ in. and 18 ft.

PLANERS.

1 16 in. x 16 in. x 3 ft. Hand Feed.
1 24 in. x 24 in. x 6 ft. Powell.
1 24 in. x 24 in. x 7 ft. L. & M.
1 26 in. x 26 in. x 9 ft. Gleason.
1 30 in. x 30 in. x 10 ft. Niles.
1 32 in. x 36 in. x 14 ft. Gray, with two heads.
1 36 in. x 36 in. x 12 ft. Powell, with two heads.
1 36 in. x 36 in. x 18 ft. Wm. Sellers.
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1 9 in. Travelling Head, Wm. Sellers.
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1 No. 4 Windsor, W. F. & P. F.
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1 18 in. P. & W. Chucking, with Bk. G., F. C. and P. F.

MISCELLANEOUS.

1 51 in. Niles B. & T. Mill, one head.
1 3 ft. Portable Riveter.
1 Heavy Geared Splitting Shear.
1 Whiton 4 in. Centering Mch.
1 Circular Shear.
1 2 in. Washburn Twist D. Grinder.
1 Garvin Cutter Grinder No. 3.
1 No. 2 Bement Hor. B. & D. Mch.
1 No. 0 Newark Hor. B. & D. Mch.
1 No. 2 Pedrick & Ayer Cyl. Borer.
1 2 in. H. & R. Cutting Machine.
3 Bolt Cutters, different sizes.
1 10 in. New Haven Slotter.
1 IXL Saunders Pipe Mch.
1 No. 5 Saunders Pipe Mch.

Send for Circular. Prices on Application.

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BARGAINS IN

NEW AND SECOND HAND MACHINERY.

Lathes from 12" to 48." Planers from 20" up to 60", 48" 54" and 60" Radial Drills. No. 2 Newton Milling Machine, No. 2 Screw Machine, Shapers from 6" to 30". Boilermakers' Punches, Shears, Edge Planers, Rolls, Drills, Engines, Boilers, Pumps and Dynamos.

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A reliable Chicago concern, located in the machinery district, and selling Hydraulic Cider Presses, has facilities for handling another line of goods in connection, as cider press season is short. Correspondence for Western Agency solicited. Reliable references.

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Working Machinery.
WILLIAM BARKER & CO.
Cincinnati, Ohio.

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15" Steptoe Crank Shaper.
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24" x 24" x 6' Pond "
30" x 30" x 6' Gray "
20" Barnes Drill.
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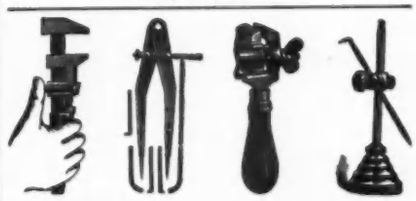

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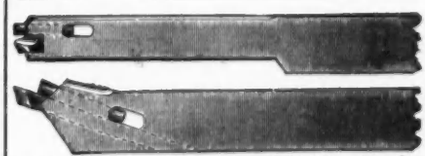

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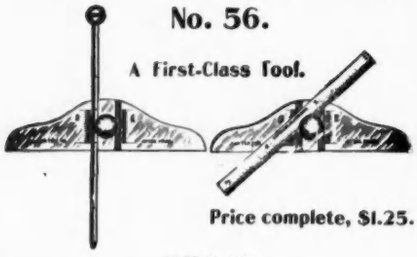

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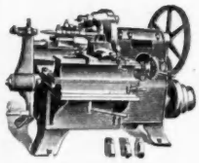

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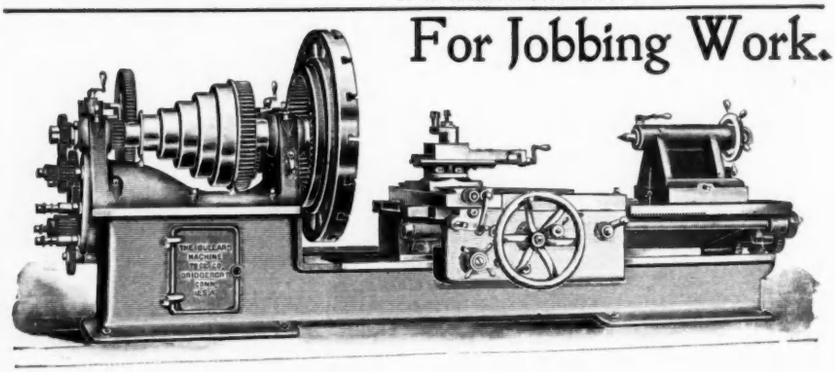

The Bullard "Extension" Lathe is unsurpassed. One bed on top of another. It's a regular 32-inch lathe when closed and a 54-inch when opened—and you can open it four feet. Good because it does so much without adjustment—always ready. Write us about it.

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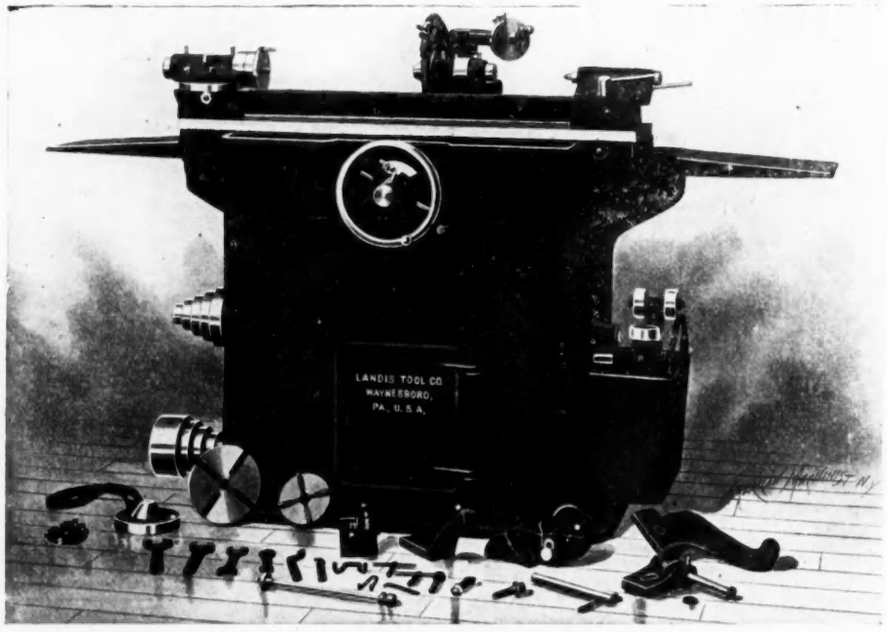

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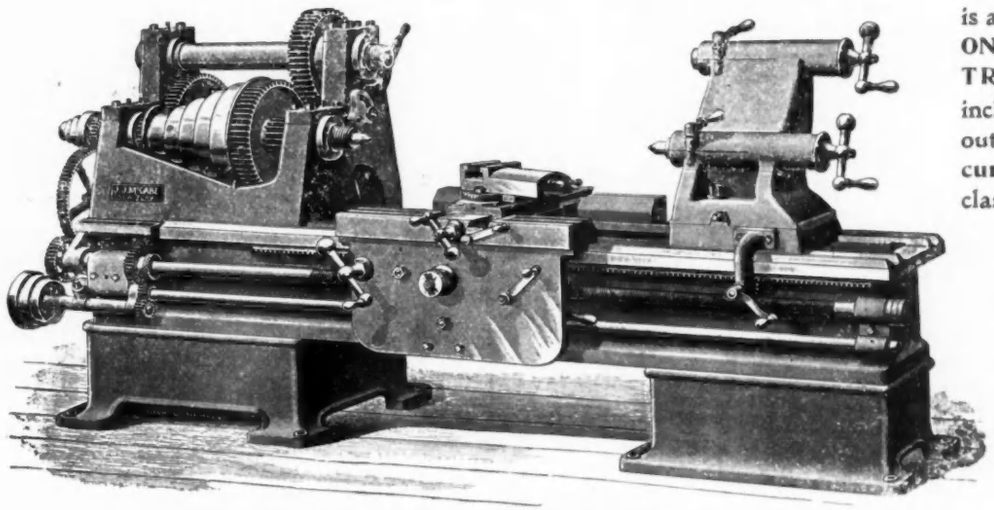

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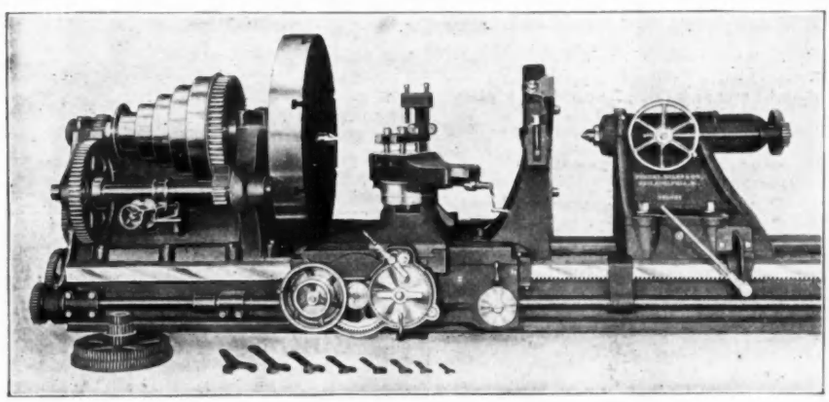

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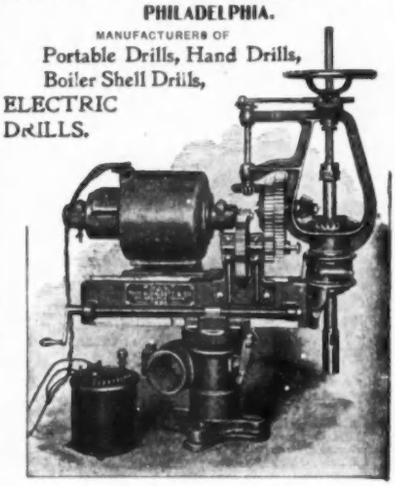

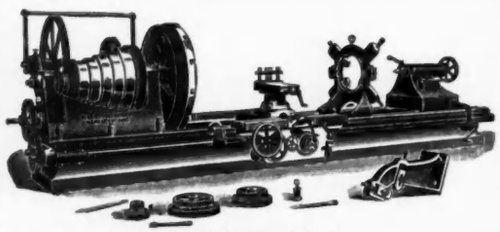

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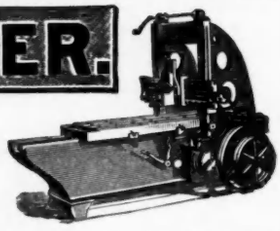

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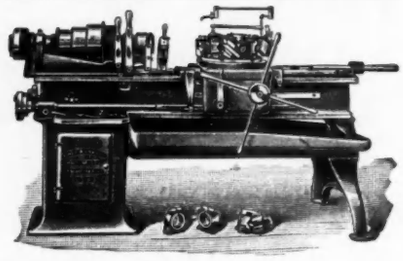

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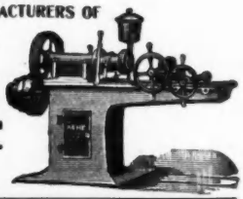

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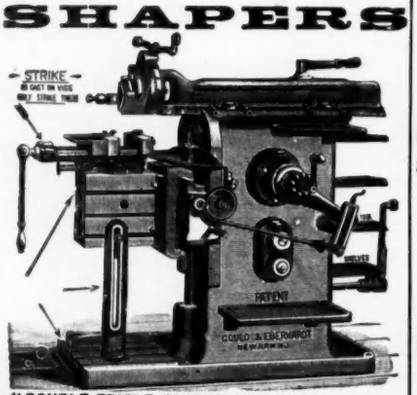

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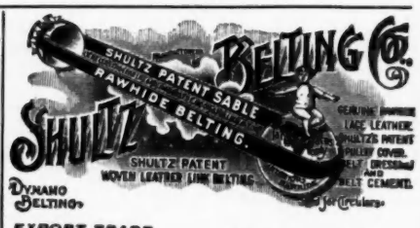

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